VOLUME XX

QUEENSLAND AGRICULTURAL JOURNAL

Issued by direction of

The Hon. the Secretary for Agriculture

Edited by J. F. F. REID

JULY to DECEMBER, 1923

QUEENSLAND AGRICULTURAL JOURNAL.

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QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment.

The Current Issue.

The place that agricultural education is occupying in the public mind is recognised by the amount of space devoted to it in this issue. An important Ministerial statement on the proposed abolition of the Queensland Agricultural College, at Gatton, and the creation of a modern Agricultural High School in its place outlines a progressive educational scheme; an abridged report of a noteworthy public lecture on the relation of science to agriculture, by Professor Goddard, of the Queensland University, is included in this section. A review of the work of our Sugar Experiment Stations is continued. A useful contribution on cream grading, and details of a comprehensive project for the marketing of Queensland fruit are also notable features. The development of the Burnett lands, and the various projects for water storage in that district, revives interest in the question as to whether we have yet fully considered the possibilities of the regulated use of water in districts in which irrigaton may be applied, and makes the publication in this issue of the first article of a series on "Irrigation in Queensland" opportune. The regular features are as usual full of information for farmers engaged in the sections of the industry to which they respectively apply.

World's Farmers in Congress.

The Eleventh International Agricultural Congress, at which some very important problems affecting the world's fundamental industry were discussed, assembled in Paris in May. Over 200 delegates from various countries contributed to the deliberations. M. Chéron, the French Minister of Agriculture, touched on one of the major difficulties of the present day when he referred to the tendency to beat down the prices paid to farmers as a disastrous policy, which would result in the abandonment of the land by people who were unable to make ends meet, and cause the world's commerce to suffer. In all countries the prices of primary produce, with few exceptions, are near, or even below, pre-war parity, whereas the growers have to pay from 75 to 100 per cent. above pre-war rates for the manufactured articles they require. The post-war readjustment has penalised the country for the benefit of the towns; but the present state of affairs is too unfair to be stable. There is little hope, it is feared, of the people of industrial centres acting voluntarily to restore a more equitable

economic balance. In Queensland, however, farmers have now an opportunity, through the operation of recent far-reaching legislation, of obtaining something more like a fair deal, and their economic future may be shaped largely by their own hands. An obvious additional aim is to make efficient agricultural organisation truly federal and establish a co-operative and co-ordinated system throughout the Commonwealth.

The Middleman's Margin.

A writer in "The Nation and the Athenæum" (14th April, 1923) quotes from a recent very interesting book entitled "Food," by Sir Charles Fielding, the late Director-General of Food Production in the United Kingdom, as follows:—

"To sum up the subject of unaccounted-for and seemingly unwarranted difference between producers' receipts and consumers' payments, there seems to be an excess of £175,000,000 now paid by the consumer and kept in the hands of the distributors, viz.:—

For bread	£52,000,000
For meat	£78,000,000
For milk	£45,000,000
	£175,000,000

over and above what is paid to the farmers, the railway, and in excess of the reasonable working cost of the miller, baker, and butcher, and after allowing about 10 per cent. profit on the cost of commodities they purchase and deal in."

Sir Charles Fielding also shows the part of the price paid by the householder which is obtained by the farmer, who has twelve months' work with his animals, till they are fit for slaughter or to milk, and the part which finds its way into other pockets, viz.:—

"Farmer gets of the price paid for bread	35 per cent.
Farmer gets of the price paid for meat	40 per cent.
Farmer gets of the price paid for milk	47 per cent.
Miller, baker, and transporter get of bread price ..	65 per cent.
Butcher and allies get of meat price	60 per cent.
Milk combine and transporter get of milk price ..	53 per cent."

The foregoing table, though perhaps not entirely applicable to Queensland conditions, provides ample food for thought by those who might possess a lingering doubt as to the necessity of complete organisation in our own agricultural industry.

New Agricultural Legislation Foreshadowed.

In the first session of the new Parliament the Government policy of agricultural betterment in Queensland will, it is anticipated, be extended further along the road to organised and stabilised industry. Among land and agricultural measures understood to be on the stocks are proposals relating to the regulation of co-operative companies to provide that they be genuinely co-operative and not proprietary, the provision of water supplies for farming groups, to fodder conservation, to the storage and marketing of maize, to agricultural education, to an amendment of the Main Roads Act providing for control of roads in new settlement areas, and to other rural matters not fully provided for in existing legislation.

The Future of the Sugar Industry.

In the course of the month the Prime Minister's sugar proposals were submitted to the growers for consideration by the Premier (Hon. E. G. Theodore), and the replies received from the sugar districts indicate a general, though reluctant, acceptance of the Commonwealth policy, coupled with a protest against the inadequacy of the Federal offer. A pool has since been constituted and a Pool Board appointed, the members of which are Messrs. W. Short (General Manager, Bureau of Central Sugar Mills), G. H. Pritchard (representing the Australian Sugar Producers' Association), and T. A. Powell (representing the United Canegrowers' Association). On behalf of the pool, Mr. Theodore has consented to take over the stocks of sugar in the hands of the Commonwealth, approximately 50,000 tons, subject to stocktaking and book values.

Our Future Stock Breeders.

Apropos of the activities of the Queensland State Educational authorities in the direction of providing for sound grounding of country scholars in rural subjects it is interesting to note and quote what a writer in the "Breeders' Gazette" has to say on the value of catching our future stockbreeders when they are young. He

claims that enlivening and sustaining the interests of youngsters in stock matters are among the most effective means of spreading the gospel of better stock, and are alike beneficial to the producer and user. The idea is to reach the raiser of poor grade or scrub stock, with a view to demonstrating in a practical manner by himself the advantages of feeding and raising a calf or a pig, or any animal or pure breeding alongside a scrub or grade. A few months' feeding, the scales, the price, and the use of a lead pencil tell the story and bring about, unconsciously perhaps, the preparation of a death warrant for the uneconomical scrub. This is ground gained—gained by an actual demonstration by the owner on his own farm by following his own methods. The results convince beyond any question. Breeders' associations, national or local, may well afford ao devote much time to boys and girls' calf and pig club plans, with a view to facilitating the organisation of such clubs in every district where there is a desire for one. It would mean much to the improved live stock; it would mean more for the boy and girl who joined the club, for it would give them a greater interest in the work of the farm, something worth while to work with in which they have an added interest because it is new and different. Their thoughts would be centred on their work, and when they finished the work in hand they would have a better idea of what goes to make up the type of animal of the breed, and would want no more of scrub stock. Moreover, it would broaden their vision. They would see things in farming and the development of farm animals that were not before apparent. They would become interested, and interesting work is never drudgery. The more intelligently one applies himself to his work, the better and greater the results. The first thing is to make the work interesting. One thing that the junior clubwork has done is to make the feeding of good live stock interesting to farm boys and girls. Boys and girls of to-day are the men and women of to-morrow. Anything that will increase their interest in their work, or cause them to strive to excel, tends to a progressive and contented people, and the creation of a better atmosphere. It aids in rearing the right kind of men and women to carry on the rural interests of the country.

Farmers' Enterprises: A New Zealand View.

The chairman of the Bank of New Zealand (Sir George Elliot) had something to say recently ("Dominion," 16th June, 1923) on co-operation generally among farmers. Reviewing the development of co-operation in the Dominion during the period 1895-1921—a period of rising prices—he said that, had the co-operative companies consistently adhered to the lines upon which they were inaugurated, they would have reached a sound financial position. Bad leadership had, however, brought about in some instances a total loss of shareholders' funds, and in others a very unsound state of affairs. Co-operative freezing companies were the greatest sufferers. Certainly some of the losses could not, even under the best of management, have been avoided, owing to the sudden and heavy fall in the value of meat; but, unlike proprietary and joint stock concerns, most co-operative companies made little or no attempt in prosperous times to reduce their heavy liabilities or to make adequate provision for contingencies. Instead, they launched out on a most extravagant scale on borrowed money, so that when straitened times came several had to close up, whilst others were staggering along under a great burden of debt. The principles of co-operation had much to commend it; it could be made of great value to farmers, but only if sound financial principles were followed. Some of the dairy companies in the Dominion were in a thoroughly satisfactory position, thanks to directorates that had recognised the necessity for building up capital and reserves and keeping down indebtedness. Those companies had come through the depression with ease, and it would be well if the example they had set were taken to heart by others. Proprietary and joint stock concerns were making inroads in the business of co-operative companies, and would continue to do so unless the latter kept their finances on a sound footing and conducted their affairs on business lines.

Proposed Milk Pool.

A project for the creation of a metropolitan district milk and cream pool and the establishment of central distributing depôts is now under Ministerial consideration and the review of those concerned in the industry. The project has advanced to the stage of favourable recommendation from the Council of Agriculture to the Government. Pending submission of the scheme to the Cabinet, the Minister for Agriculture and Stock (Hon. W. N. Gillies) is seeking the views of the metropolitan local authorities. The Minister proposes to meet the local authorities in conference with the object of placing the plan before them, as it is really their job to supervise and control the distribution of milk supply on modern lines for the city and its suburbs. The suggestion is that a pool be created for five years. The scheme provides against overlapping by vendors in distribution, for the protection of the consumers, and a guarantee of reasonable rates to the producer.

IRRIGATION IN QUEENSLAND—I.

By H. E. A. EKLUND, late Hydraulic Engineer, Queensland Water Supply Department.

Subjoined is the initial chapter of a comprehensive survey of irrigation possibilities in Queensland. Mr. Eklund was formerly in the State Service as an Hydraulic Engineer and as Executive Engineer in charge of the Inkerman Irrigation Works in North Queensland, and is now engaged on an important water supply project in South Australia. The widespread interest now centred upon land settlement in Queensland, and the general practical development of the forward Government policy in relation to agricultural extension and the enrichment of rural life in this State, makes the publication of Mr. Eklund's observations particularly timely. The review will be continued through succeeding issues of the Journal.—Ed.

INTRODUCTION.

Apparently the first, or among the first attempts, to place on record information regarding the irrigation possibilities of Queensland was made by Major A. J. Boyd, F.R.G.S. The information compiled by him, though printed, does not appear to have become widely known, and much valuable and interesting matter, therefore, escaped notice at the time. In the following pages much of Major Boyd's compilation has been condensed and revised, and this attempt to bring before the public the success of, and necessity for, irrigation in Queensland is due to a suggestion made by Major Boyd. Being unable to clothe the facts in the easy and pleasing style that is characteristic of the former editor of the "Queensland Agricultural Journal," I have rather endeavoured to show possibilities than to record history. Originality is not claimed for this work. It may rather be classed as an attempt to collect, from many sources, and summarise such facts, figures, and particulars as have been made the subject of numerous inquiries. I hope that this endeavour will be of some use to those who are not masters in the art of irrigation.

IRRIGATION IN QUEENSLAND—SECTION I. HISTORICAL.

Irrigation may be defined as the science of artificially supplementing an insufficient rainfall in order to obtain the best possible result from cultivation of the soil. Though agricultural in its object, it forms a special branch of engineering, on account of the works needed to obtain and control the supply of water. Efficient irrigation in its fullest sense is a modern achievement, but it is possible that the ancients who practised the art knew more about it than can be gleaned from existing records. The earliest mention of irrigation on a large scale appears to be an inscription by a Babylonian monarch (Hammurabi: about 2200 B.C.), who thus records his engineering achievements:—"I have made the canal of Hammurabi a blessing for the people of Shumir and Accad. I have distributed the waters by branch canals over the desert places. I have made water flow in the dry canals, and have given an unfailing supply to the people. I have changed desert plains to well watered lands. I have given them fertility and plenty, and have made them an abode of happiness."

Irrigation has probably been practised in certain localities in China continuously since about the time of Confucius. In Europe it appears to have fallen into disuse during the warring ages, but the concentration of population on fertile areas of uncertain rainfall necessitated an attempt to ensure uniformity and certainty in the return of cultivated products. That these attempts have been crowned with success can be seen wherever irrigation is properly practised.

As an indication of the extent to which irrigation is practised, it may be mentioned that in India over 40,000,000 acres are intensively cultivated by artificial application of water. In the United States, where irrigation, as compared with other countries, is of recent origin, no less than 10,000,000 acres are dealt with; and in Europe at least 15,000,000 acres are irrigated lands.

The necessity for irrigation generally, in Australia, is governed not so much by a concentration of population as by the uncertainty of rainfall. The interior portion

of the Australian continent is liable to severe droughts, and over great portions of coastal areas the rainfall is capricious. Particularly is this the case with Queensland; yet practically all the other States of the Commonwealth, notably Victoria and New South Wales, have established large irrigation schemes, and during drought it is from these irrigated areas that Queensland must obtain her produce, though our climate, with water, is better suited to quick growth and abundant crops than that of the Southern States. The reason for this being that given water, the humidity, essential to good growth, is greater because of the higher temperature. Many attempts to explain this fact have been made, but no description is better than that offered by a French authority on irrigation—M. Auguste de Gasparin—who thus illustrates it:—

"Two units of humidity multiplied by two of heat give four, but four of heat by four of humidity give sixteen. Such is, in fact, the rate of progression in which are manifested the advantages produced by the association of these two essentials to vegetable growth."

It is a matter for comment, therefore, that more has not been done to foster this agricultural refinement in Queensland. While railways, for instance, may be good security for money-borrowing purposes, the fact remains that they are, themselves, not productive. It is, after all, to the primary producer that any State must look for its wealth, and if there are neither people nor produce to be carried, railways may not be as good an investment as is generally supposed.

As will be shown later, Queensland offers better facilities to the agriculturist than many of its own inhabitants appear to be aware of, and with railways already extending for over 5,000 miles the possibilities for marketing any produce grown are fair.

The point may be raised that irrigation can only be successfully practised from snow-fed rivers on account of the enormous storage capacity needed when depending on any source not perennial. This may be true as a generalisation, or in cases where a supply to large areas from one source is being contemplated, but the argument does not hold good if an abundant supply of ground water is obtainable, or, if such natural facilities exist that sufficient storage can be obtained at a cost bearing correct proportion to the rest of the scheme. Critics must also remember that the larger portion of Queensland is situated in the tropics, and the coastal ranges are within the area where monsoonal rains are experienced. These downpours largely take the place of snow in colder regions, and though more sudden and boisterous, and perhaps more trying on engineering works, they are just as efficacious as the melting snow in supplying the required volume, the run-off of such storms necessarily being large.

Another argument often used against irrigation is that we have not yet the population. The reason that so few people settle on the land as agriculturists is that farming is generally considered too uncertain. Unless farming can offer a fair inducement, young men will prefer the city and a certain, if less profitable, employment, but the growth of our cities will be limited unless backed up by closer settlement in the country. Closer settlement in the country will only take place when the farmer knows that his labour will give a return, and this certainly will never appear until water conservation (and also irrigation) is more generally practised. As our pastoral industry remained a speculative investment with odds against it until the artesian supplies were made available, so will our agricultural pursuits remain a gamble until irrigation is employed wherever possible.

It is not essential that irrigation should be practised on a large scale to be profitable or individually successful. In many localities sufficient ground-water can be obtained to enable each farmer to have a private installation, as has been done on the Lower Burdekin, or on the River Don at Bowen, and several other districts. The results in cases are not so good as they should or might be, but more scientific methods of applying the water and a system of carefully recording both applications and results would soon cause a general and marked improvement.

The financial difficulties to be overcome by a State undertaking a large irrigation scheme are almost invariably more troublesome than the engineering problems in connection with any particular project. Very large schemes require correspondingly large amounts of money spent, and the interest accumulating on this money usually becomes a national bugbear before the scheme is sufficiently advanced to show any return whatever, let alone catching up to and holding the interest in check, or showing profit. Any irrigation settlement as a whole cannot show as a successful venture until at least the majority of the settlers are privately successful. A sufficient portion of the area must also be occupied before the scheme can be considered to be potentially successful. One of the greatest difficulties is to obtain a sufficient number of settlers with irrigation experience who understand how to make a success of their

individual efforts from the start. Much time is generally lost in teaching and helping the less apt farmers, who require "nursing" through the experimental stage. This reacts on the scheme as a whole until the "nursing" stage is passed, for on the success of the irrigator depends the success of the scheme. For these reasons any State desirous of making a success of artificial agriculture should eliminate the necessity for the nursing stage by educating its farmers to become efficient irrigators, and encouraging private effort before the launching of a big scheme takes place.

Such education could readily be given to the farmers in this State, where provisions already exist for group settlements, which by the nature of their constitution are self-supporting from the start.

In a State like Queensland, where adequate water supplies are of such vital importance, one would think that water supply engineering would be considered a science of some consequence. If such were the case, and if the remuneration paid for such services were proportionate to the knowledge and skill necessary, it is possible that greater value would be placed on any advice given by engineers. It is an infallible axiom that anything we obtain is valued at the price paid. Hence a doctor or a wise lawyer will never give free advice. Why should an engineer? And yet engineers are generally expected to give free advice, the result being that it is a much more difficult matter to find a good engineer than a good doctor or lawyer. To relieve this difficulty in the future, it would pay the State to encourage water supply engineering by offering travelling scholarships to University students in this branch of technical science, just as much as it would pay some chambers of commerce to offer large scholarships to students in technical chemistry.

There is much work to be done before a large irrigation scheme can be intelligently designed for Queensland, past effort in this direction, if any, having apparently been spasmodic and undirected. It is yet extremely doubtful if the essentials for a successful, purely gravity scheme exist, and nothing else appears to have been considered in connection with any preliminary investigations made. There are, however, many localities in Queensland where smaller areas have the appearance of promising good results by an adoption of correct methods, and it is possible that once an attempt has proved successful, administrative eyes will be opened to possibilities in this direction, and a vigorous and needful water conservation policy may be the result.

"The farmer is the one indispensable man. His industry is the industry of society. The real and fundamental prosperity of any State is vested in the soil."

An idea appears to be entertained by many that irrigation is an expensive luxury—too costly to be indulged in by the average farmer. It may be stated at once that though irrigation is *the most expensive* method of farming, it is also the *most profitable when intelligently practised.*

There are just three things about water in connection with production that our familiarity with this commodity has apparently caused us to forget:—

1. It is the cheapest element to produce when its actual value is considered.
2. It is the most essential thing to production, whether primary or secondary.
3. It is the most productive agent, and chemically and physically the most active substance known.

In connection with farming, where water in abundance is readily available without the necessity for expenditure on storage or conservation works, the outlay on a pumping plant is an investment which should be made in the nature of an insurance policy. The subsequent cost of irrigation may then be found to bear about the same ratio to profits as would the premium to the amount on a life policy. Especially is this the case during a drought, when produce brings a good price and any attempt at raising a crop without irrigation would prove an abortive experiment. In one case, where over £40,000 were spent on an irrigation plant, the undertaking is said to have paid for itself in two seasons.

It is not now possible to ascertain who made the first attempt at irrigation in this State. The credit would probably fall to some Chinese gardener. It is, however, fairly certain that it was first practised on a larger scale by the sugar-growers in the Lower Burdekin district, and the lead in that locality appears to have been given by Brandon and Spiller, the owners of the Pioneer sugar plantation.

(*The next article will cover irrigation on the Lower Burdekin and in other Queensland sugar areas.*)

THE ENTERPRISING FARMER AND FINANCE.

CO-OPERATIVE BANKS AND THEIR USES.

BY F. W. STRACK, F.A.I.S., F.C.I.S. (ENG.).

An address on the history and working of Co-operative Banks was read at the Convention of the Chamber of Agriculture, held at Hamilton (Vic.) on 11th April. Mr. Strack is an acknowledged authority on banking, and his remarks will be followed with interest. We have curtailed portions of the history of the establishment of Co-operative Banks in order to give full space to the practical details.

This subject is much in the air nowadays, and it is as well for men on the land to know something about the matter, for such banks are designed solely in their interests.

It is beginning to dawn upon the farmer that he has not been getting that fair deal in financial matters that he is entitled to. Honest men will admit that it is only through the hard work of the men on the land that any work at all is available to men in our cities. Sixty-six pounds out of every £100 of our Australian national wealth is supplied by primary producers, yet the Savings Banks in 1921 loaned only £20 in every available £100 to men on the land, while the trading banks probably did no better; therefore the time is ripe for more assistance and consideration to be given to those producers, and at the moment politicians in every State are falling over each other to assure the farmer that Codlin is his friend and not Short. They are talking loudly of helping him with loans, and all sorts of financial schemes are in the air, but all to be under control of red tape Government departments.

Now all this is the experience of other countries, and the only really successful efforts to help the producers has come from the men themselves, in some form of co-operation. This has taken the form of Co-operative Banks, and we will proceed presently to inquire as to how these institutions are worked and how they meet the long-felt want of those who produce so much of a nation's wealth, and yet who do not get the proper financial help at the proper time. The system of loans that can be called up at a moment's notice is the worst that can be devised, so far as farmers are concerned.

The trading banks do not, and cannot, lend on long terms. In Australia we are subject to periods of drought, when crops fail and stock die. But these troubles pass in time, yet it often happens that in the very midst of one of these trials money is "tight," or the loan the farmer has from his bank is called up, and he is at once in financial straits.

This is all wrong, and the only remedy is some arrangement whereby he shall be tided over the bad times; this remedy lies in the long-term loan. We are rather prone in a young country to try to get rich too quickly—we want to buy our farm and add acre to acre and clear it of all debt in one lifetime, whereas the next generation should be required to do its share. Again and again we see a man working like a slave, year in and year out, struggling to have his farm free to hand down to his children. He sacrifices himself, and his wife does the same, for years, but when he passes away his son takes life much more easily. He discards father's old spring cart and buys a motor-car, forgetting the long and weary struggle his parents have made in their efforts to pass down the property free of debt.

The long-term loans would distribute the work, the worry, and the debt a little more evenly, to the advantage of each generation.

Many European nations have grappled with the problem, and have gone a long way to solve the difficulties of financing the men on the land. The main lessons to be learned from a study of the world's land credit systems are the tremendous benefit to farmers of long-dated loans, and the ease with which money can be obtained by the issue of debentures secured by the solidarity of groups of land-owners, or by the assets of a co-operative association properly supervised and carefully managed.

The only really successful co-operative associations for long-term credits in other parts of the world are those where only members are borrowers. Experience of many years and in many countries proves that such associations are the best for

obtaining long-term loans at low rates of interest and on easy terms. The association issues debentures, and in exchange its members—the borrowers—give it a mortgage over their property.

A co-operative society such as a village bank or people's bank of a European country, is an association of individuals, and not a combination of capital. It rests on self-help.

Speaking generally, the European Co-operative Banks have from 50 to 150 members, who buy one share of about £2 10s., paying for it by instalments spread over two years. Where no shares are issued the members are jointly and severally liable for all debts of the association. In case of loss, a creditor can sue any one of the members whom he thinks can pay, and he can take them in turn until his debt is satisfied. But as there are no shares the reserves grow steadily, and it is very rare that any individual member is called upon to pay the association's debts. In these societies outside deposits are not always taken, and the security required for loans is much like that of the ordinary trading bank, except that the character of the applicant is taken into account, so that under proper safeguards a loan may be made to a person with no property, but whose asset is a good character.

Now, in a new land like ours we move about from place to place more than they do in the older lands, and our lands do not so often remain in the one family. This has the effect of making us more careless of our character and of our probity. In the result, therefore, personal character here is not usually an asset available as security for a loan.

The European farm mortgage is generally from ten to seventy-five years' duration, equal instalments being paid with interest quarterly, half-yearly, or yearly. The rate varies according to circumstances, but from ½ to 1 per cent. is added for a sinking fund when periodical repayments are made. These sinking fund amounts are reinvested with the society, and, of course, carry interest.

In France, true amortisation is the rule; that is, so much principal and interest is payable at stated intervals, so that as principal is paid off interest payments decrease until finally the last payments include scarcely any interest, but mostly principal.

In European associations a custom is growing up for borrowers to take out a life insurance policy, which the society holds against long-term loans, so that if the borrower dies the debt has not to be carried on by his descendants.

Co-operative banking is making headway in British India, and wherever established these banks quickly stamp out the awful usury that is so prevalent in India. What militates against their more rapid spread is the inordinate love of the native for hoarding gems and ornaments. Since time began he seems to have a craving for precious stones and metals, and seeks to obtain them even though he may be living in the greatest squalor and poverty.

The associations have either limited or unlimited liability of members, and where the liability is limited no member may hold more shares than of a face value of 1,000 rupees (about £70). After devoting quarter of the profits to reserve, the remainder may be divided. Where the liability is unlimited, all profits go to reserve until it reaches a certain percentage of the liabilities outstanding.

Neither class of association takes deposits from non-members or lends money to them. Most of them buy and sell for their members in addition to doing all their banking.

In Japan, mutual assistance amongst farmers is a practice as old as amongst Europeans. As a rule, their co-operation is for the sale of produce and the purchase of requirements, but pure co-operative credit societies number over 10,000, with a membership of over 1,000,000. Just before the war the rates of interest were excessive in Japan, and the co-operative associations granted from 6 to 13 per cent. for deposits, charging from 12 per cent. to 18 per cent. for loans.

As 87 per cent. of the farmers of Japan keep a family of four or five on the produce of less than 5 acres, it is a marvel how they can pay such high rates for monetary assistance.

In Ireland, in 1918, there were 236 rural co-operative credit societies, but sixty of them were practically moribund, and no progress has been made since.

Neither in England nor Wales does rural co-operative credit show much vitality. The reasons assigned for the slow growth are the reluctance of the farmers to borrow, and so exhibit their financial needs to their neighbours, and they do not like the idea of unlimited liability.

In Scotland, up to a year or two ago at any rate, the idea had not caught on, mainly because the ordinary banks afforded more facilities to the small man than in any other part of the Empire. May I venture to suggest that no Scotchman would

appreciate his neighbour knowing all about his financial position, though perhaps he is not averse to knowing his neighbour's affairs.

In North America, the first co-operative bank was started in Quebec in 1900. Its first receipt was the sum of 5d. By 1914 its assets equalled £61,000. Of its 7,200 loans, about 1,200 were for £2 or less, and none exceeded £20, while it has never lost 1d.

A very large number of these People's Banks sprang up in Quebec, and they now have about 25,000 shareholders, with 10,000 borrowers, with loans of from 5s. to £200, aggregating over £500,000, and averaging £52 per loan—total capital, £200,000.

These banks raise their capital by selling shares at £1 each, in instalments. They deal very little in mortgages, but lend mostly on personal security.

In other parts of Canada, seven years ago, several of the Provincial or State Governments took power to provide money for loans to farmers.

In Nova Scotia the Government will assist in rather an unusual way. Thus, if a loan company advances a farmer 80 per cent. of the value of his property, the Government will guarantee the loan company to the extent of 40 per cent. of the value, but repayments must first go in reduction of the Government guarantee. Loans for machinery and plant are freely granted, and have proved a great boon to farmers.

In New Brunswick the Farm Settlement Board has power to buy and sell real estate and personal property for *bonâ fide* settlers. The Government has power to raise loans in order to supply the board with funds.

In Ontario, under the Farm Loans Act, the Government lends funds to any municipal corporation, which in turn lends it out to farmers in its district, but at least half of each loan must be for permanent improvements. The corporation takes a debenture for each loan, and the debenture is held by Government. A special rate is levied on the particular property to meet the annual interest and sinking fund.

The loan must not exceed 60 per cent. of the value of the property, and under certain conditions the loan may be repaid at any time.

In 1919 the Government lent about £1,000,000 towards the purchase of seed, machinery, live stock, buildings, creameries, mills, &c.

Many other parts of Canada have their People's Co-operative Banks, and in the United States there are numbers of Federal Land Banks or Farmer Loan Associations; these must have a minimum capital of £150,000 before the law allows them to start. Loans from the bank run from £20 to £2,000, borrowed only by members. The term is from five to forty years, repayment being on the amortisation principle; that is, fixed regular payments of principal and interest.

With all of these associations, however, the Government has a finger in the pie, and there is the usual red tape, with all its vexatious accompaniment of delay, expense, and want of human sympathy.

In conclusion, it appears that co-operation in farm loans to be successful must have—

Undoubted means of ascertaining the value of the property.

Low legal expenses.

Economy in working the institution.

Safeguards for the lenders.

Restrictions against thriftless borrowing.

Reduced to a few words—the system of co-operative banks can be explained as associations of producers lending their own money to each other on long easy terms, assisted perhaps by outside deposits and Government loans.

Farmers usually have little idle cash, as they can do better with it on their farms. The Co-operative Bank attracts them rather than the ordinary bank, because it is far more economical, and profits do not leave the district to go out of the country. Moreover, the Co-operative Bank attends to all his financial dealings, whether sales, purchases, or investments, particularly in insurance in all its forms; above all, it helps to eliminate that parasite—the middleman.

As to long-term loans—the only danger is the temptation to borrow unnecessarily owing to the day of reckoning being so far off, but there are two classes of farmer that it is a boon to—the young man and the old—the young man, because it enables him to make a start on virgin land, and to buy the property out of the annual produce of the soil; the older man, because, having pioneered and borne the heat and burden of the day, he can use a larger portion of his income for his own comfort in advancing years, leaving the next generation to do its share of paying for the property.

—Extract from "Australian Farming."

SUGAR: FIELD REPORTS.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report, under date 27th June, 1923, from the Northern Field Assistant, Mr. E. H. Osborn:—

Invicta Mill, Haughton Valley.

In this district conditions had been slightly better than in Ayr, as the local rainfall had been 7.61 inches, against that of 1.47 inches for the same period at Ayr, but which was, of course, quite inadequate to allow the cane to do its best. In consequence the crops were very backward. Quite a number of the farmers had installed tractor-driven pumps for irrigation purposes.

There are now twelve tractors at work in the district.

Mr. J. Humphreys had some very good plant and first ratoon Badila growing on unirrigated land. Considering unfavourable weather, this is a very good crop. Mr. R. W. Walton also has some very fair cane, mostly N.G. 24, N.G. 24B, and B.208, growing upon sandy loam. This farmer uses a 6-inch and 4-inch pump driven by a tractor, but so far had only watered once. Up to the time of visit, grubs had not shown up to any great extent in the area, but Messrs. Wight, Snow Brothers, and Nelson, who had all used arsenic previously, are still satisfied by their ratoons that its use was of benefit to them.

Rollingstone, Ingham Line.

This area has also been short of its customary rainfall, the total fall for the year (up to 8th May) being 17.77 in. only. As most of the soil is of a light, loamy nature, a fairly heavy precipitation is required for good cane-growing.

Despite the dry conditions some good crops were seen upon several farms, notably upon Mr. C. Barney's property, where a splendid stand of July-planted Tableland Badila was much admired.

Nearby, some Plant Tableland Badila cane of about six weeks of age had struck very well. Mr. V. Tilbey, too, had some very good Badila and H.Q. 426 upon his farm, as also had Mr. G. T. Peebles, of Coolbie. Nearer Rollingstone, Messrs. Barnes and Webster are hoping to have about 100 acres under cane for 1924. They are now working up a block that has had a green crop ploughed in, and which looks well. These growers are using a tractor for most of their work.

Bambaroo.

Conditions here were rather better than in the Rollingstone area, the rainfall for the same period being 21.02 in. Quite a number of new settlers are hereabouts, and although the present year will be a poor one from a growers' point of view, yet the number for next season will be much greater. Last year about thirty growers supplied the Giru mill with cane grown between Rollingstone and Toobanna. With any sort of favourable weather about sixty suppliers will be represented in 1924.

Some very fair H.Q. 426 and Badila first ratoons were seen upon Mr. A. Holland's place. A 12-acre block of six weeks old Plant Badila looked very pleasing. Adjoining the latter is a 28-acre block of deep scrub land, now being cleared of bananas for cane-growing by Mr. Holland. The farms of Messrs. Talbot, Hecht, Ross, and Melvin looked very well, when the scanty rainfall is considered. Two of these growers, Messrs. Talbot and Hecht, have used manure with their first ratoons with appreciable results.

On account of these areas being so scattered it was impossible to get around as many places as one would have wished. In the Rollingstone area much valuable assistance was given me by the courtesy of the Local Producers' Association, and in the Bambaroo area by Mr. D. W. Ross.

Herbert River Area.

This sugar centre was reached in the middle of May, and was found to be on the light side as far as the rainfall was concerned. So far at Ingham the registration had been:—January, 6.46; February, 4.38; March, 5.79; April, 6.84; May, 0.63 in., or a total only of 24.12 in. Naturally the cane was on the backward side, and will probably cut under the earlier estimates.

This dry weather, although unfavourable to this year's growth, has enabled a very large area of ground to be planted early for next season, the resultant strike in most cases being very good. Most of this young cane is very clean, and with favourable conditions should result in a heavy crop for 1924. Although the pasturage

so far looked very fair, there was very little water in the creeks or river. For instance, Gredge's Crossing has been fordable with a vehicle continuously this year, whilst in an average year this is very rare during the first months of each year.

Pests.—Prior to my visit a good deal of damage had been done to the crops by caterpillars. In one place the leaves had been stripped from stools, showing 5 and 6 feet of cane. Although not very bad in any one place, the presence of grubs in scattered areas seemed more noticeable than in former years. The dry conditions being experienced helped, of course, to accentuate this.

Liming.—The use of lime is steadily increasing in this large area. One Halifax grower (Mr. E. C. Biggs) used 1 ton of earth lime to the acre in 1921. Last year he used 2 tons per acre, and he intends using the same quantity this year. His plant cane that had been treated now looks remarkably green and healthy.

Tractor power.—Tractors have been the means of several growers getting fairly large areas planted in good time this season. One farmer with 60 and another with 50 acres of forward young cane, each attribute its healthy appearance to their being able to take full advantage of the weather conditions.

Varieties.—H.Q. 426 (Clarke's Seedling), Badila, H.Q. 409, the Gorus, Black Innis, D.1135, Nanemo, Korpi, Oramboo, and Q.813 are all being grown in this area, the last seven in much smaller quantities. Of these varieties, Q.813 is steadily gaining favour. Mr. Blackburn, of Macknade, is satisfied with it after a two-years' trial. He has planted out some 13 acres this year, and mentions that it is the only variety where he has not had to supply. Most of his March planting of this cane shows far better growth than canes of other varieties of a similar age planted elsewhere, especially when the very medium quality of the soil whereon it is planted is taken into consideration. Readers of the Journal will recollect that for two years in succession this cane has had the second highest average density in the Proserpine area, and last season held the record for the year at Mossman, with an average density of 15.59 c.c.s.

Innisfail.

This area was visited at the end of May, the conditions there being most promising. The rainfall had been sufficient for a good growth of cane, and in consequence the Goondi area looked very fine. Some splendid crops were seen, notably upon the newer lands of the Upper Daradgee, and again lower down the river upon Mr. H. Stone's property. This property will probably average a 35-ton crop throughout, for plant and first ratoons. Generally speaking, the crop to be harvested this year should be nearly a record one, as the tonnage per acre will probably be very high. When it it remembered how many years a large proportion of the area has been under cultivation, it certainly speaks well for the fertility of the Johnstone River lands.

As mentioned previously, manuring is carried on to a large extent in this locality. It will be remembered that owing to cold and, later on, to dry weather, the 1922 crops, although manured well, did not give the expected results. One grower, in speaking of this, expressed the opinion that although his crops were on the light side last year, yet his ratoons are now showing the effects of such manuring.

Pests.—In the Goondi area there are very few traces of grubs to be seen this year, nor is the presence of borers as apparent as in other years.

South Johnstone.

Up to time of writing the rainfall recorded at South Johnstone amounted to 64.22 in., which, although light, had been sufficient to enable the cane to make very fair growth. Probably the best cane is to be seen upon No. 7 Branch (Myers') and at Miskin's, whilst some very solid cane was also seen upon No. 1 Branch, and at the end of Kalbo. In this direction some very good first ratoon Badila twelve months old was noticed upon Mr. T. Zampatti's ground, a lot of it lying down already.

Pests.—Very little damage has been done by grubs this year in the area. The only place showing any effects is in the vicinity of the $12\frac{1}{2}$-mile on the Nerada line, where some 40 to 50 acres have been slightly damaged.

Cane Varieties.—Quite a few of the newer canes are being now grown in the South Johnstone area, among them E.K. 1, E.K. 28, H.Q. 458, H. 146. Most of them are more forward than the usual varieties that are being generally planted. Some very fair Green Goru, 24B, Red Goru, N.G. 24, Striped Goru, and N.G. 24A was seen upon the red soils.

On the same soils and upon the Nerada line some very good 7R 428 (Pompey) carries an exceedingly heavy crop of plant cane about twelve months old.

Tractors.—Several new ones of different makes have been put in use here since my last visit some months ago; the owners all speak well of their machines.

The Southern Field Assistant (Mr. J. C. Murray) reports to the Director of Sugar Experiment Stations, under date 5th July, 1923, as follows:—

Bingera.

The cane on this area looks better generally than the other centres visited. This applies to both scrub and forest loams. On the red forest loams at Bingera South the cane looks particularly vigorous; in fact, it has in many instances the appearance of hardly having received a check from the dry weather. Varieties outstanding in the Bingera district are 1900 Seedling, Q. 813, H.Q. 285, and Black Innes. Other canes mentioned in previous reports are growing, but the varieties named will probably give the best returns.

Farmers are trying most of the standard fertilisers on scrub soils, with positive or negative results according to the rainfall, while on the forest loams the most consistent returns are being obtained with bone dust. It costs approximately £9 per ton to get this fertiliser landed at Bingera railway siding. Farmers are advised in this area to work an interchange of plant as much as possible, forest loam plants to scrub and *vice versâ*. This is a factor, combined with careful selection of sets, in preventing deterioration. There is very little disease in this area, although D.1135 in patches is showing signs of gumming. Leaf mottling occurs at intervals, but there were no canes noticed showing secondary symptoms of "leaf stripe."

Gin Gin.

The crop in this district looks well, considering the adverse weather conditions. The cane is green and full of growth, although the stick is short. However, cane that is being milled after, say, September, should give a fair tonnage. This applies particularly to the 1900 Seedling.

Varieties that present a good appearance in this area just now are 1900 Seedling, H.Q.285, Q.813, and D.1135. The farmers are advised to concentrate more on growing these than the first-named canes as much as is reasonably possible. Although 1900 Seedling is an excellent cane in many respects, it is a mistake for a farmer to have all of this variety. If this cane is cut early the stool often bleeds and the subsequent stools suffer from what might be called "debility," and the c.c.s. value is not the same as if the cane is cut in October. It is wise, therefore, to have a small acreage of an early maturing cane with 1900 Seedling. During this coming season the growers are recommended to work into the soil any available vegetable matter.

Childers.

This important sugar centre is suffering considerably from the effects of the dry weather. The cane is green, however, and if the winter is not too severe it should make good growth by the end of September. As is usual with this district, the farms are clean and present a well-ordered appearance. There is very little disease in the cane as far as could be observed, and parasites that make sugar-cane their host were not greatly in evidence. Green manuring is being carried on fairly extensively, and the growers are actively interesting themselves in local experiments with varieties and fertilisers. Local fertilising experiments are very important on these lands.

Farmers who are growing D.1135 in the Childers district and intend to go on doing so would be well advised to try to get a change of plants from, say, the Bauple or the Nambour districts. They are advised to try more extensively H.Q.285 and Q.813. It is not advisable for any grower to devote all his area to raising 1900 Seedling.

Maryborough.

Cane looks well in this district. The rainfall since January has been very well distributed, and on Tinana Creek and The Island Plantation some really splendid crops of D.1135 and 1900 Seedling are to be seen. Growers in these localities are now taking cane-growing more seriously than heretofore, but as yet the areas under cane are but a small portion of what could be profitably planted.

Farmers in the Maryborough district still have a number of old varieties which it would be profitable to discard in favour of those which are more resistant to disease. The growers on The Island are getting excellent results from filter-press refuse obtained from Millaquin. This material has small manurial value, but it improves the texture of the soil and consequently creates a greater feeding area for plant roots. Lime and green manures would be very beneficial on most of the Tinana Creek cane lands.

Growers here should never hesitate, if it is at all possible, to spend a little time and capital on chipping and otherwise combating weed growth. Proper application of labour at the right time always pays handsomely in sugar-cane.

A better organisation of the harvest facilities is required in the Maryborough district. This would probably mean a much greater output of cane. Economic harvesting means lessening that all-important factor to the Queensland farmer, the cost of production.

Pialba.

The farmers here have no reason to be disappointed with their prospects. The cane is green and healthy, and although the stick in most instances is not long, there are patches of very fine cane showing. This applies particularly to the Q.813. One farmer has the whole of his available cane land under this variety, while others have a fair portion under. The rich scrub land that divides the mountain area from the coast is being gradually cleared, and some that has already been planted is showing excellent cane.

Varieties doing well at Pialba include 1900 Seedling, Q.813, Q.970, Q.1098, M.89, D.1135, and Shahjahanpur No. 10. Greater interest is being taken in obtaining the best canes, and it is probable, if the farmers work with enthusiasm in this direction, that the district will soon be yielding much more.

Farmers are advised to go in more for local experiment with fertilisers, and to communicate with the Bureau of Sugar Experiment Stations on matters upon which they wish information.

As mentioned in previous reports, greater work could be done with liming and planting leguminous crops in the Pialba district than is being done at present.

Useful crops as green manure are cowpea, Mauritius beans, velvet beans, tares, vetches, rape, soya beans, and maize. Speaking generally, growers are more concerned at the economic outlook than any other factor. Unless the position is consolidated fimly and quickly, the advance of the industry will receive a setback from which it may take years to recover.

SHEEP BLOW FLY PEST.

A REVIEW OF EXPERIMENTS SINCE 1913.

By W. G. BROWN, Sheep and Wool Expert.

In the course of the very serious outbreak of the pest in 1913, when from 23 to 75 per cent. of the sheep were attacked in the Central District, a commission of inquiry was sent out to investigate the conditions.

A report was furnished by Major A. H. Cory, Chief Inspector of Stock, and Mr. Edmund Jarvis, Assistant Entomologist, in 1913. In that report it was stated that the owners of over 1,000,000 sheep were interviewed, and various opinions as to control were expressed. These were shown in the published report of these gentlemen.

A recommendation was made that the Department should experiment, for the purpose of finding some means to either abolish or at least control the pest. Accordingly, sheep were purchased and sent to Gindie State Farm, and several methods were tried out. Numerous specifics, of all kinds, were tried and found—some valueless, some fairly effective, and a few good.

In 1918 the Commonwealth Institute of Science and Industry took over the experiments, and working on the lines of the Gindie results, they succeeded in giving a reasonable protection, at a very moderate cost, for the sheep men. It is not practicable in the present review to give all the measures taken in detail, as the work extended over seven years. It was observed early in the operations that the problem was very complex. For instance, it came to be seen that specifics that gave good results at first were found to be useless later. Paddocks badly infested in one fly season were found comparatively free later. The life histories of the various flies worked out by the entomologists varied, and were found to be very incomplete. They could not say whether flies were local; that is, whether they stayed where they were hatched, or travelled for miles; or whether the presence of carrion was essential for their propagation. Neither of these questions has been answered to-day, and they are both most important factors in the solution of the problem. At the end of over seven years of experimentation, we can look back and say that four methods were tried, and it may be interesting to give them in their order. They were—

(*a*) Methods to drive flies away from the sheep;
(*b*) Methods of attacking and destroying flies;
(*c*) Methods of combating the flies by parasites; and
(*d*) The method of attracting flies to sheep and poisoning them and their progeny on the animal.

(*a*) Taking them in the above order, it was obvious that if the flies could be kept away from the sheep there would be no infestation. Consequently, every effort was made to get a specific which would drive away the flies. Not one was found to do that. After repeated trials, sheep were still attacked. It should have been known

that a female fly full of eggs must get rid of her burden, and nothing can prevent her placing them somewhere. In the presence of a sheep and the absence of carrion, the conclusion was forgone, unless a prohibitory influence could be found. None was found.

(*b*) Then it was thought that if the flies were attacked and destroyed, the end would be gained. Traps of various kinds were invented and tried, and one in particular caught flies by the hundred thousand, and a solution of the question appeared to be in sight. It was found by experience, however, not only in the experiments, but by the wide-spread use of traps all over Queensland, that however many flies were caught there still remained more than enough to cause just as serious losses as were sustained before traps were tried. Traps were, therefore, abandoned.

(*c*) Then the question of natural parasites presented itself. In 1913 Mr. Edmund Jarvis discovered a parasite (*Nasonia Brevicornis*) which parasitised the pupæ of flies. These wasps were found in a district (Longreach) where from 23 per cent. to 75 per cent. of the sheep had been attacked. Later they were found in several other districts in Queensland, and by Mr. W. Froggat, Government Entomologist of New South Wales. Thus it did not seem very hopeful that a parasite such as *Nasonia Brevicornis* would be of much value, considering that so many losses were sustained in the districts where it was so numerous. Yet in the hope that it would be helpful the parasite was cultivated and issued. Results were nil, or nearly so.

(*d*) In 1916 it came to be known that the Manager of Orion Downs, Springsure District, was using a method which gave at least 90 per cent. of protection to his sheep for a longer or shorter period. This method consisted of jetting a poisonous solution—namely, Cooper's Sheep Dip, at quadruple strength into the breech of the sheep, where 90 per cent. of the attack is made by flies. This was tried at Gindie and found good, but somewhat costly. When the experiments were taken in hand by the Institute of Science and Industry, and Mr. Russell, of Dalmally, handed over plant and 25,000 sheep for experiments, a number of the specifics tried at Gindie and found useful, with several new ones, were applied. Among them was the Orion Downs formula. Mr. Russell considered the matter and came to the conclusion that it was only the arsenic in the dip which gave the results, and suggested that trials with plain arsenic should be substituted. Knowing little of the effects of the poison at that time, the Committee was chary of using the strength required as contained in four packets of Cooper's Dip per 100 gallons of water, but Mr. Russell said to the Committee: "Here are the sheep and the plant, go as far as you like."

A good proprietary sheep dip in solution ready for use contains about 0.2 per cent. of arsenic, or 2 lb. of arsenic to 100 gallons of water; therefore, if the Orion Downs formula of four packets of 10 lb. each be used in each 100 gallons of water, a total amount of 0.8 per cent. of arsenic is jetted into the breech of the sheep. Mixed with this quantity of arsenic was sulphur and other ingredients. From the time that plain arsenic of not less than 90 per cent. quality was used, it became evident that a method had been evolved which gave protection for a certain period (about 12 weeks). The next thing to be considered was the effect of arsenic as jetted on to the breech of the sheep. Various strengths were applied, up to 1.5 per cent., or 15 lb. to the 100 gallons of water, and the sheep treated with this extreme proportion carefully watched for weeks. In no case was there found any ill-effect, either on the animal or the fleece. It was found, however, that increased strength did not give increased protection after a certain point in the percentage of arsenic in the solution was reached. It was found that 0.7 per cent., or 7 lb. per 100 gallons, was quite as efficient as higher percentages. By analysis of the wool taken weekly from the jetted sheep it was learned that from the very day of the jetting process the amount of arsenic in the wool decreased, until at the end of about three months there was only a negligible amount of the poison left. This accounts for the fact that no more than three months' protection could be given. On the commercial side of the proposition it has been found that one-fifth of a penny will cover the cost, this including reasonable charges for labour.

The net result of the latest experiments is this:—If sheep be jetted with a solution of from 5 lb. to 7 lb. of arsenic per 100 gallons, the arsenic being dissolved in either equal parts of carbonate of soda or half that quantity of soda ash, the animals are protected for about three months. It does not matter how much growth of wool is on the sheep's back. The more the better.

Another result is that after jetting a mob of sheep dead flies of all kinds are to be found in the yards and in the paddocks. All the maggots which have been deposited by the flies do not live long enough to be mischievous. Thus the sheep are not only safe from the maggots, but they act as a fly trap of the first order.

An important matter is that pressure of up to 150 lb. per square inch, varying according to the length of wool to be penetrated, is absolutely necessary.

This process has now been tried in all parts of Queensland, and has never yet failed in giving the protection described. Therefore, until the biologists and entomologists can give us something better, it is safe to say that the problem is solved to the extent of 90 per cent.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report dated 26th June, from the Entomologist at Meringa, Mr. Edmund Jarvis:—

PARA-DICHLOROBENZENE PROVED TO BE AN EFFECTIVE FUMIGANT FOR CANE GRUBS.

In my April report the appearance of our experiment plots at Greenhills and Meringa on the 28th of that month was outlined, when the condition of treated cane in both these localities was found to be very satisfactory.

I mentioned that about the end of April several yellowing grub infested patches had commenced to show up in the check plots at Greenhills, but that no such indication of grubs was observable in the area treated with para-dichlor.

Similarly, on the plots at Meringa one could quite easily pick out the treated from check stools by the decided difference in the colour of the leaves; the treated cane being dark green, while that in check rows continued getting yellower day by day.

During the interval between 22nd April and 17th May, only 36 points of rain fell at Meringa, with the result that an examination of these experiment plots on the latter date yielded still more convincing proof of the effectiveness of para-dichlor. as a cane-grub destroyer; the contrast between green and grub-smitten lines of stools having, during this dry interval of about twenty days, become very marked indeed.

At this time interesting evidence was afforded in connection with the work of injecting these stools on 25th January.

This work was carried out by different men, each using a "Jarvis" injector, and treating separate rows, the cane on that date being less than 3 feet high. In some rows, stools had been accidentally missed, while others had not been injected to the proper depth (owing possibly to the spear having met with a stone or other hard substance). The whereabouts of such missed stools, however, was now clearly revealed, four months after the application, by yellowing of the foliage, due to some of the grubs at these points having escaped fumigation.

By carefully counting all the stools in six of the treated and the same number of untreated rows of cane, the following conclusive results were obtained:—

Plot 1 Treated: (Three rows consisting of 900 stools of cane)—20 stools affected.

Plot 1 Untreated: (Three rows consisting of 900 stools of cane)—575 stools affected.

Plot 2 Treated: (Three rows consisting of 900 stools of cane)—49 stools affected.

Plot 2 Untreated: (Three rows consisting of 900 stools of cane)—779 stools affected.

Note.—Injections in Plot 1 were made 12 inches apart, 4 inches from plants, and 6 inches deep, while in Plot 2 injections were 18 inches apart.

Affected stools occurring in treated rows were often surrounded by, or growing alongside, green injected cane, thus showing that such occurrence was, in many cases, not due to failure of the fumigant at all, but to defects in application. This was very clearly exemplified in the case of a row consisting of 300 stools injected by one operator, and which happened to form one edge of a treated plot. This row presented an unbroken line of green foliage and did not contain a single affected stool, showing that it had been carefully and uniformly treated throughout the entire length. Running parallel to it, and only 4 feet 6 inches away, the edge of the adjoining check plot formed an almost continuous row of yellow grub-eaten cane. The unmistakeable contact between these two rows of cane growing side by side was amply sufficient in itself to prove the effectiveness of the fumigant. The next examination at Meringa was on 27th May, by which time, owing to continuation of dry weather, some of the cane in check plots had apparently succumbed, and much appeared to be dying.

The difference between treated and check stools was naturally still more marked, as injected canes had remained green, indicating the presence of enough moisture in the soil to enable stools having uninjured roots to continue making slow growth.

Between 29th May and 4th June we had a fall of 2.14 inches of rain, which came just in time to freshen up the grub-eaten cane.

The latest inspection of these plots was on 11th June, when the treated cane was seen to be higher than that affected by grubs.

Greenhill Plots.

When last examined on 11th June, we found that the injected cane had continued unaltered during the recent dry spell, without a single stool showing grub-injury; while on either side, in the check plots, decided evidence of grub-infestation was still very noticeable over patches of varying extent.

INTRODUCTION INTO JAVA OF QUEENSLAND CANE-GRUB PARASITES.

The consignment of digger-wasp parasites reported last month as having been sent to Buitenzorg, for introduction into sugar-cane and cassava plantations in East Java, were supplemented this month (May) by additional parcels containing in all 160 cocoons which were spun at our laboratory last month.

A further shipment of 75 cocoons will be forwarded to Java by the next mail boat on 9th July.

This total of 259 cocoons was derived from eggs laid here during March to June by our digger-wasps *Campsomeris tasmaniensis* and *C. radula* on the grubs of grey-back cane-beetles, each parasitised grub being confined in a separate breeding cage. The average temperature during this period was 80.73 degres Fahr., and the total rainfall about 21 inches.

In return for cocoons sent away, we shall receive from Professor Leefmans those of two species of Scoliid wasps from Java for introduction into our own canefields to combat grubs of the grey-back cockchafer and those of *Lepidiota frenchi*.

Although our digger-wasps in the Cairns district destroy every year a small percentage of the grubs of these cane-beetles, the proportion killed in this way does not vary much, owing to the natural checks imposed on these parasites by their hyper-parasitic enemies—at least three of which are already known to us, and have been studied to some extent at this station.

In all probability these natural checks would not, however, materially affect the increase of introduced digger-wasps, the hyper-parasites of which do not, so far as is known, occur in Queensland.

The establishment of inter-relationship between parasitic insects and their various hosts has not been brought about in a day, but in many cases centuries may have elapsed during such adjustment of the so-called "balance of nature." We may, therefore, reasonably assume that our Queensland hyper-parasites affecting wasps of the genus *Campsomeris* are not likely to attack larvæ of *Dielis thoracica* and *D. javana*, the two digger-wasps we are hoping to establish in our canefields.

POISON BAITS FOR WHITE ANTS.

Experimentation along this line of control work was commenced on 9th May, when a number of poisoned baits were prepared and placed in cages of soil in which specimens of the white ant *Mastotermes darwinensis* had previously nested in tunnels.

The medium used consisted of small pieces of crushed sugar-cane which had been dipped in various arsenical solutions, such as copper arsenate (with and without molasses); sodium arsenite of different strengths, &c.

Best results were obtained from the simplest preparation—viz., arsenite of copper ½ oz., water 2½ pints—which gave a mortality of 100 per cent. after four days.

The pieces of cane were merely dipped in the above solution and laid on top of the soil. The termites evidently came up out of the ground to feed on this bait, but whether they would do so under outside field conditions has yet to be determined.

Arsenious acid (white arsenic) ½ oz., sodium carbonate 1 oz., water 3 pints, proved effective after seven days, giving a mortality of 100 per cent. We are still experimenting in the laboratory with other baits and hope to report results from these and from field tests in the near future.

AGRICULTURAL EDUCATION.

PROPOSED SUPERSESSION OF THE COLLEGE AT GATTON BY AN AGRICULTURAL HIGH SCHOOL—MINISTERIAL STATEMENT.

It is intended to discontinue the operations of the Agricultural College at Gatton as at present constituted, and, in its place, to establish an Agricultural High School and College, to provide a High School education in agriculture for youths from 14 to 18 years of age. The intentions of the Government in the matter are embodied in a recent official statement by the Minister for Agriculture (Hon. W. N. Gillies).

"The Government," Mr. Gillies said, "fully recognises the vital importance of agricultural training as being an important part of the rural organisation and land settlement policy, and it has been forced to the conclusion that the Queensland Agricultural College as at present constituted is not obtaining the best results for the purpose for which it exists. This conclusion has not been reached by the Government as it is at present constituted, but the members of the Government immediately preceding had similar views. I have, as also did my immediate predecessor, given much consideration to the problem, and an adverse report by Public Service inspectors some time ago confirmed the impression that had been formed. I have no desire to animadvert in any way upon the ideas of the Government which founded the college, and am quite ready to believe that then and for years afterwards it served the purpose of its foundation, but times have changed, and there is no doubt, for the number of students who attend and the number who graduate in comparison with the cost of maintenance, the continuation of it on the present basis is not warranted.

"There is at present accommodation at this institution for sixty resident students. The average number during the past five years is forty, and the average net cost per student is £333.

Changed Conditions.

"The war made a difference in the number of students, and other colleges in Australia were affected likewise, but with every allowance for those circumstances the fact remains that the average annual number of students of all kinds—full paying, bursars, soldier, and other short-period students—for the past five years, and the average annual cost of maintenance each year, in the same period, does not indicate a satisfactory condition of things. Moreover, the college has departed in several ways from the original idea of a college; a large herd of the different dairy breeds is kept, far larger than is necessary for college purposes; pig-breeding and dealing is on a commercial scale, a butter factory is maintained, poultry competitions are carried out, and so on.

"Several methods of improvement were considered and discussed, but without practical result, because they could not be carried out upon the lines of what is really required—the broadening of agricultural education, bringing it within the reach of all who so desired, from the usual time of leaving the State school, and at the same time providing for the higher education in agriculture, preparatory to the time when there would be an opportunity for a student to take an agricultural course at the University.

The New Proposals.

"After full consideration by the Government, a special committee was appointed by the Governor in Council, consisting of Mr. E. Graham, the Director of Dairying; Mr. H. C. Quodling, the Director of Agriculture; Mr. R. M. Riddell, Inspector of Technical Colleges; Mr. R. A. Wearne, Principal of the Central Technical College; with the Under Secretary for Agriculture and Stock Mr. E. G. E. Scriven, as chairman. This was a committee of advice with respect to the reorganisation of the college, and briefly their more important recommendations were:—The establishment of a Queensland High School and College, and a Rural School for day scholars to link up with the High School. Bursaries to the High School for boys of fourteen

years who have obtained State and State High School scholarships, the first twenty annually to be free of all cost of maintenance, but preference in selection to be given to State school scholarships. Extension scholarships from the junior course to a senior standard. Travelling research scholarships, instruction by correspondence, reservation of land for students who have graduated honourably, reorganisation of the Queensland Agricultural College, of the accommodation, and the erection of additional buildings.

"The report of the committee was approved by Executive on the 14th June.

An Early Change.

"The Committee recommends that the Queensland Agricultural College be terminated, and that in its place an Agricultural High School and College be established, the intention being to provide a High School education in agriculture for boys of, say, from fourteen to eighteen years, who then, it is hoped, would enter the college at the regulation age and complete the agricultural education, so far as opportunities are provided. The date of the change has been fixed for the 1st September next, and the Department of Agriculture, in conjunction with the Public Service Commissioner, are now taking the necessary action accordingly."

THE MARKETING OF FRUIT.

A COMPREHENSIVE QUEENSLAND PROJECT.

A project of wide importance to orchardists, aiming at the improvement of the marketing of Queensland fruit, was explained by Mr. J. D. Story, I.S.O., the chairman of the Administrative and Publicity Committees of the Council of Agriculture and Public Service Commissioner, to metropolitan Press representatives recently.

"Much attention," said Mr. Story, "is being given at present throughout the Commonwealth to the fruit industry, and particularly to the question of marketing. According to Commonwealth statistics, the estimated annual value of the Commonwealth fruit industry exceeds £6,000,000; the Queensland figure exceeds £1,000,000. The decade, 1910-1920, showed an increase of Commonwealth fruit acreage of approximately 60 per cent.; the Queensland figure is also about 60 per cent. Owing to young plantations coming into bearing the production is estimated to have increased about 300 per cent., and it is still increasing. Many returned soldiers have taken up fruitgrowing. In view of the increased production, it is generally recognised that special attention must be given to the organisation of marketing arrangements on sound lines, if adequate returns are to be secured to the fruitgrowers."

A Policy for the Fruit Industry.

Questioned respecting the action taken by the Council of Agriculture, Mr. Story stated that the general question of the marketing of Queensland fruit had received the earnest attention of the Council; that existing local arrangements had been closely studied and critically examined, and that the director (Mr. Macgregor), in company with the chairman of the Southern Queensland Fruitgrowers' Society (Mr. Burtt), had visited Sydney, Melbourne, and Adelaide, and made exhaustive inquiry into the methods of the marketing of Queensland fruits in the Southern cities. A review of the whole industry was then prepared for the Council by the director, and this review formed the basis of an examination by a special committee of the Council into the various aspects of the fruitgrowers' problems. The committee had the assistance also of the Trade Commissioner (Mr. Austin) and the Director of Fruit Culture (Mr. Benson).

The outcome of the deliberations was the formulation of a policy for the fruit industry.

Principal Recommendations.

Some of the principal recommendations were:—

That an Act of Parliament should be asked for, covering the organisation of fruit marketing.

That an endeavour should be made to use local organisations and corporations already in existence and existing agencies of distribution as far as practicable.

That local organisations should be allowed to trade in fertilisers, fruit cases, and other growers' requisites by consent of the central organisation, but the activities of the central organisation to be confined to the marketing of fruit.

That each local organisation should be a member of the central organisation to control marketing in Brisbane, Sydney, Melbourne, Adelaide, and elsewhere.

That the central growers' organisation should be controlled by a committee of direction, to be elected annually by members of the local organisations, and one member nominated by the Council of Agriculture, the committee of direction not to exceed ten in number, and to be comprised as follows:—Banana growers, 2; pineapples, 2; citrus, 2; deciduous, 2; small fruits, 1; and a nominee from the Council of Agriculture; the committee of direction to control matters of general policy, but it to be permissive for the committee to delegate certain powers to an executive of three, to be elected from among their own number; that the growers' representatives on the committee of direction be elected by growers on a sectional basis, and that the members of the committee of direction retire annually, but be eligible for re-election.

Other Suggestions.

Further recommendations were:—

That the central organisation be a non-profit, non-capital organisation.

That the proposed Act vest in the committee of direction control of the marketing of all Queensland fruit as from a date to be fixed.

That a vigorous policy should be pursued to attain the objective that all fruit transmitted to market will pass through either community packing sheds, or, alternatively, a form of inspection in cases in which the application of the packing shed principle is impracticable or undesirable.

That provision should be made for the institution of packing sheds on the requisition of the growers concerned.

That the fruit should be marketed under the growers or community brand, and at the outset growers be invited to nominate those agents by whom they desire their fruit to be handled, and in order that as little disturbance as possible may result, an endeavour be made by the committee of direction to the effect that fruit which has been marketed by growers for years through one agent shall still go through that agent.

That agency or other representations should be established in the larger towns in Queensland, such as Gympie, Maryborough, Rockhampton, Bundaberg, Mackay, Cairns, Mount Morgan, Toowoomba, Roma, and Goondiwindi, as well as in such places outside the State as Newcastle, if necessary.

That consideration should be given to the running of a special fruit train on country railways, and that consideration also be given to instituting negotiations with the Commissioner for Railways with a view to railway station-masters acting as agents on a small commission basis.

That encouragement should be given to the establishment of co-operative retail shops by growers' societies, but not under the committee of direction.

That marketing, both in the sphere of the local and central organisations, be conducted on a non-profit basis, growers securing full benefit of freight concessions and any other savings.

That provision should be made for this scheme to be operative for a term of three years, and to continue thereafter, unless on requisition of 500 growers a ballot be demanded, and a majority of registered growers demand discontinuance.

A Conference Called.

Mr. Story added that an exhaustive pamphlet containing a review of existing methods of marketing of Queensland fruit, with concrete proposals for the reorganisation of the industry, had been prepared by direction of the Council, and this pamphlet is being issued to Local Producers' Associations in fruit-growing districts. A conference of delegates of these associations would be held in the Council of Agriculture Building on Thursday, 19th July, to consider the proposals of the Council. This conference of fruitgrowers was likely to be one of the most momentous of fruit conferences ever held in Queensland, and in view of the important issues involved the delegates should carefully study the proposals beforehand, and come to the meeting fully equipped to discuss them in all their phases. The conference had been called so that the Council, when it approached the Government, would be in a position to assure it that it had the support of the growers, for whom it was devised. Provided that the producers approve of the scheme, the Government would be asked to legislate on the lines indicated, or with such modifications as the conference may have recommended, and the Council of Agriculture approved.

FRUIT FLY COMBAT AND CONTROL.

WESTERN AUSTRALIAN EFFORTS—REMARKABLE RESULTS CLAIMED FROM GROWER'S MASSED ATTACK.

The Western Australia Minister for Agriculture (Hon. H. K. Maley) has made available the following report received from the officer in charge of fruit industries (Mr. G. Wickens):—

The results of the efforts at Spearwood (W.A.) to control the fruit fly are of great interest to fruitgrowers. The plan was first outlined by the district orchard inspector (Mr. C. Simmons), who told the growers at a meeting he was certain much better results would be obtained if the growers combined and paid someone to apply bait to the trees regularly once in every ten days, instead of depending upon carrying out this work themselves. A majority of growers at the meeting favoured giving the suggested innovation a trial; the Minister for Agriculture agreed to assist by lending a spray pump, donating £15 towards the provision of fruit fly bait, and instructing that Mr. Simmons should personally supervise the work.

"Fifty-seven orchardists came into the scheme, the portion of the district covered being approximately one mile and a-half by three miles. A man was engaged, who provided a horse, cart, and labour for 25s. per day.

"Baiting commenced on 21st October, 1922, before the ripening of the first stone fruits, and has been continued once in every ten days until 10th February, the trees of each variety being treated as the fruit ripened sufficiently to render it liable to attack by fruit fly.

"The trees were baited in the usual way—that is, they were not covered with the material, as a customary when treating most insect pests, but a small quantity only was sprayed on the leaves on two sides of each tree, missing the fruit as much as possible. This is why I refer to the operation as baiting instead of using the usual word 'spraying.' The bait used is known as 'Newman's fruit fly bait,' and is put up in tins ready for use, 10 gallons of water being added to 1 gallon of prepared bait.

"The conditions obtaining this season are ideal from the fruit fly's point of view. There is an exceptionally heavy stone fruit crop, and, prices being low, growers (I am not now specially referring to Spearwood) are not so careful in picking up fallen fruits, nor are the trees so carefully cleared of all ripe fruits, as when fruit is scarce and prices high.

"Consequently, there is, unfortunately, in many orchards in districts within 50 miles of Perth, where the infection is worst, abundant material in which the pest can, and does, propagate and spread. I am mentioning this specially because it makes the results obtained at Spearwood all the more noteworthy, where out of the fifty-seven orchards treated, there were only two in which infected fruit was found this season, and the loss in these was limited to about four cases in one instance, and half a dozen fruits in the other.

"The Spearwood growers set out to prove two things—firstly, whether fruit fly could be kept under control by systematically baiting the trees; and, secondly, whether the cost, when combining and paying a man to do the work, was less than with each man attending to the application of bait in his own orchard.

"So far as the former is concerned, it has been proved to be a fact in this State a number of times both by the entomologist of this department (Mr. Newman) and also by individual growers, but, where the Spearwood effort differed from previous ones was the co-operation of growers to keep a whole district free.

"So successful have the operations been that growers in the area treated, with the two slight exceptions mentioned above, have gathered the whole of their stone fruit free from fruit fly, commencing with early Newcastle apricots in November, and finishing with Elberta peaches on 10th February. The cost has worked out very low, being less than 3d. per treated tree for the season, including labour and material.

"It is particularly worthy of mention that, while the orchards in the co-operatively treated area are free from fruit fly, there are some very close to its boundaries where fruit fly is plainly in evidence, and this notwithstanding that the owners of the latter are supposed to be applying bait exactly in the same way as is being done for the combined growers by the man who is paid to do the work.

"The Spearwood growers are to be congratulated upon the result of their efforts, as is also Mr. Simmons, the officer of this department, who initiated and practically organised the movement."

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JUNE, 1923.

Good rain fell on 4th June, and then a cold snap set in, the temperature falling to 33.5 degrees. During the rest of the month cold westerlies prevailed, which kept the birds indoors most of the day. However, in spite of the weather, the laying was very good. In the light breeds, C. H. Singer's pen made the best score, with 132 eggs, while in the heavy breeds Jas. Petter's Black Orpingtons laid [illegible] eggs. The following are the individual scores:—

Competitors.	Breed.	June.	Total.
	LIGHT BREEDS.		
*C. H. Singer	White Leghorns ...	132	341
*W. and G. W. Hindes	Do.	[illegible]	322
*N. A. Singer	Do.	126	321
*S. L. Gremer	Do.	109	309
*Ancona Poultry Club	Anconas	118	297
*Oakleigh Poultry Farm	White Leghorns ...	110	291
Jas. Hutton	Do.	100	290
*Rock View Poultry Farm	Do.	[illegible]	[illegible]
*O. Goos	Do.	106	284
*J. W. Newton	Do.	94	280
*Beckley Poultry Farm	Do.	101	275
F. Sparsholt	Do.	100	261
*J. W. Short	Do.	90	254
*J. M. Manson	Do.	104	251
*R. C. J. Turner	Do.	95	252
*Bathurst Poultry Farm	Do.	105	250
*Mrs. L. Andersen	Do.	105	250
G. Marks	Do.	101	250
Jas. Harrington	Do.	83	240
G. E. Rogers	Do.	91	237
*H. P. Clarke	Do.	106	236
*Geo. Williams	Do.	97	235
*Arch. Neil	Do.	90	227
*A. C. G. Wenck	Do.	101	226
*Mrs. R. E. Hodge	Do.	95	220
W. A. and J. Pitkeathly	Do.	65	213
*H. Fraser	Do.	81	211
Jas. Earl	Do.	80	206
*C. A. Goos	Do.	104	206
W. Becker	Do.	80	200
C. Quesnell	Do.	72	189
Chapman and Hill	Do.	72	188
W. and G. W. Hindes	Brown Leghorns ...	71	185
*Mrs. E. White	White Leghorns ...	79	179
E. Ainscough	Do.	74	168
*J. Purnell	Do.	81	144
Parisian Poultry Farm	Do.	68	140
*N. J. Nairn	Do.	62	118
	HEAVY BREEDS.		
*W. Becker	Chinese Langshans ...	105	314
*R. Burns	Black Orpingtons ...	118	298
*Jas. Hutton	Do.	113	294
*Jas. Ferguson	Chinese Langshans ...	120	290
*Mrs. A. E. Gallagher	Black Orpingtons ...	114	285

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	June.	Total.
	HEAVY BREEDS—*continued.*		
*Jas. Potter ...	Black Orpingtons	126	283
J. R. Douglas	Do.	113	281
R. Conochie ...	Do.	96	266
*E. Walters	Do.	104	265
*H. M. Chaille	Do.	115	254
*Mrs. A. Kent	Do.	108	252
*E. F. Dennis	Do.	115	248
Beckley Poultry Farm	Do.	84	243
W. T. Solman	Do.	100	237
*R. Holmes	Do.	100	227
*Parisian Poultry Farm	Do.	91	227
*T. Hindley	Do.	101	223
*J. H. Jones	Do.	74	208
Jas. Ferguson	Plymouth Rocks	105	200
*Rev. A. McAllister	Black Orpingtons	82	194
G. E. Rogers	Do.	104	191
H. B. Stephens	Do.	84	185
W. F. Ruhl	Do.	92	176
W. G. Badcock	Ch. Langshans ...	78	174
*C. C. Dennis	Black Orpingtons	112	170
V. J. Rye ...	Do.	72	145
Jas. Ferguson	Rhode Island Reds	67	91
F. J. Murphy	Black Orpingtons	51	77
Mos. Stephens	Do.	51	71
Total	...	6,374	15,406

* Indicates that the birds are being single tested.

DETAILS OF SINGLE HEN PENS.

Competition.	A.	B.	C.	D.	E.	F.	Total.
			LIGHT BREEDS.				
C. H. Singer ..	53	76	55	44	50	63	341
W. and G. W. Hindes	46	63	44	43	62	64	322
N. A. Singer ..	48	61	58	58	47	49	321
S. L. Grenier	48	51	57	51	53	49	309
Ancona Club	48	47	59	43	45	55	297
Oakleigh Poultry Farm	57	53	40	45	54	42	291
Rockview Poultry Farm	52	58	52	50	40	36	288
O. Goos	43	54	55	40	43	49	284
J. W. Newton	50	49	45	31	49	56	280
Beckley Poultry Farm	52	36	31	50	51	55	275
J. W. Short ..	38	44	48	52	45	27	254
J. M. Manson	39	31	53	52	40	39	254
R. C. J. Turner	33	46	43	46	30	54	252
Bathurst Poultry Farm	41	47	38	48	39	37	250
Mrs. L. Andersen	25	48	51	54	35	37	250
H. P. Clarke ..	50	20	48	34	41	43	236
Geo. Williams	50	52	26	39	35	33	235
Arch Neil ..	37	26	23	46	56	39	227
A. C. G. Wenck	37	27	39	45	32	46	226
Mrs. R. E. Hodge	24	37	24	45	48	42	220
H. Fraser ..	42	28	29	29	39	44	211
C. A. Goos ..	36	52	36	35	23	24	206
Mrs. E. White	28	23	44	35	24	25	179
J. Purnell ..	26	10	38	12	38	20	144
N. J. Nairn ..	36	11	30	18	11	12	118

EGG-LAYING COMPETITION—*continued.*

DETAILS OF SINGLE HEN PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
			HEAVY BREEDS.				
W. Becker	52	64	59	51	46	42	314
R. Burns	58	34	47	35	77	47	298
Jas. Hutton	55	52	59	46	40	42	294
Jas. Ferguson	54	53	46	45	48	44	290
Mrs. A. E. Gallagher	46	56	47	48	45	43	285
Jas. Potter	29	58	47	46	43	60	283
E. Walters	54	59	32	33	38	49	265
H. M. Chaille	38	52	51	51	26	36	254
Mrs. A. Kent..	37	64	45	60	34	12	252
E. F. Dennis	56	39	36	36	48	33	248
R. Holmes	36	29	37	31	43	51	227
Parisian Poultry Farm	13	34	44	47	48	41	227
T. Hindley	38	51	49	52	19	14	223
J. H. Jones	36	34	40	38	15	45	208
C. C. Dennis	32	38	13	29	28	30	170

CUTHBERT POTTS, Principal.

NATIONAL UTILITY POULTRY BREEDERS' ASSOCIATION COMPETITION, ZILLMERE.

REPORT FOR MAY.

A total of 2,077 eggs were laid at the above competition during May, an average of 15.73 eggs per bird. Two birds were troubled with warts and two have had bowel trouble, and colds have affected the laying of two other pullets. Otherwise. all the birds are in good health. No. 87 was replaced owing to sickness. The following birds have been moulting—Nos. 21, 32, 47, 52, 82. Nos. 96, 110, and 111 have been broody.

Pen No.	Owner.	May.	Total.	Pen No.	Owner.	May.	Total.
			WHITE LEGHORNS.				
62	Miss L. M. Dingle	26	52	43	Kelvin Poultry Farm	21	38
75	W. Shaffrey ...	24	46	16	W. J. Berry ...	21	38
15	W. J. Berry ...	25	45	65	R. Duff	22	37
14	Enroh Pens ...	23	45	18	A. W. Ward ...	21	37
42	W. Wakefield ...	21	44	76	W. Shaffrey ...	19	36
8	Oakleigh Poultry Farm	20	43	45	F. R. Koch ...	16	35
40	J. Earl	21	43	30	W. and G. W. Hindes	17	35
33	A. S. Walters ...	20	42	3	T. H. Craig ...	23	34
72	W. H. Forsyth ...	24	41	31	H. Needs ..	16	33
41	W. Wakefield ...	21	41	7	Oakleigh Poultry Farm	20	33
66	R. Duff	20	41	28	H. T. Britten ...	20	32
64	S. Lloyd ...	21	40	36	J. T. Webster ...	14	32
61	Miss L. M. Dingle	21	40	55	G. Baxter	18	32
27	H. T. Britten ...	21	40	70	R. Shaw	23	31
22	M. F. Newberry...	20	40	51	Kidd Bros. ...	22	31
81	J. E. G. Purnell...	20	39	38	G. Williams ...	21	31
13	Enroh Pens	20	39	20	W. Witt	21	30
50	J. Harrington ...	22	38	10	R. C. J. Turner ...	15	30
49	J. Harrington ...	20	38				
48	R. D. Chapman ...	23	38				

NATIONAL UTILITY POULTRY BREEDERS' ASSOCIATION COMPETITION, ZILLMERE—*continued.*

Pen No.	Owner.	May.	Total.	Pen No.	Owner.	May.	Total.
	WHITE LEGHORNS—*continued.*						
54	H. Holmes ...	21	29	39	J. Earl	11	21
57	H. Fraser ...	14	28	67	J. and G. Green ...	15	20
26	E. Stephenson ...	16	28	73	A. Hodge ...	16	19
35	J. T. Webster ...	13	26	6	P. J. Fallon ...	13	18
84	L. Andersen ...	19	26	58	H Fraser ...	6	17
4	T. H. Craig ...	23	26	34	A. S. Walters ...	12	17
56	G. Baxter ...	20	25	5	P. J Fallon ...	13	17
59	G. Scaletti ...	13	25	77	W. Smith ..	13	16
29	W. and G. W. Hindes	20	25	17	A. W. Ward ...	8	15
				11	A. Neil	6	15
71	W. H. Forsyth ...	21	24	12	A. Neil	15	15
24	Parisian Poultry Yard	14	24	78	W. Smith ...	9	14
				23	Parisian Poultry Yard	11	14
19	W. Witt	15	24				
37	G. Williams ...	17	24	68	J. and G. Green ...	10	11
2	Carinya Poultry Farm	21	24	46	F. R. Koch ...	2	11
				83	L. Andersen ...	7	9
74	A. Hodge ...	9	23	79	W. Bliss	7	9
69	R. Shaw	14	23	85	A. Cowley ...	2	7
14	Kelvin Poultry Yard	19	22	86	A. Cowley ...	0	6
				80	W. Bliss	5	5
25	E. Stephenson ...	15	22	21	M. F. Newberry ...	0	5
53	H. Holmes ...	22	22	9	R. C. J. Turner ..	4	4
63	S. Lloyd	18	22	47	R. D. Chapman .	0	2
32	H. Needs ...	6	22	82	J. E. G. Purnell ...	0	1
1	Carinya Poultry Farm	19	22	52	Kidd Bros ...	0	0
				60	G. Scaletti ...	0	0
	BLACK ORPINGTONS.						
95	J. Potter	30	57	105	W. Smith ...	23	27
92	J. Pryde	25	49	110	T. Brotherton ...	6	26
112	H. M. Chaille ...	23	48	106	W. Smith ...	19	26
119	J. Harrington ...	23	47	98	W. Shaffrey ...	23	23
102	Enroh Pens ...	24	46	117	E. C. Raymond ...	18	22
96	J. Potter	19	44	93	H. B. Stephens ...	10	21
89	K. Macfarlane ...	25	42	101	Enroh Pens ...	20	20
113	E. Walters ...	21	40	118	E. C. Raymond ...	18	20
115	C. C. Dennis ...	24	39	108	E. F. Dennis ...	17	20
120	J. Harrington ...	18	39	94	H. B. Stephens ...	18	19
104	L. Pritchard ...	25	37	116	C. C. Dennis ..	13	13
99	S. Donovan ...	20	35	114	E. Walters ...	11	11
109	T. Brotherton ...	29	32	87	Parisian Poultry Yard	11	11
88	Parisian Poultry Yard	24	30				
				103	L. Pritchard ...	10	10
111	H. M. Chaille ...	6	29	100	S Donovan ...	0	9
91	J. Pryde	24	29	97	W. Shaffrey ...	4	7
107	E. F. Dennis ...	23	27	90	K. Macfarlane ...	1	1
	OTHER BREEDS.						
131	W. H. Forsyth (S W.)	26	41	123	J. Ferguson (Anc.)	10	10
				122	Parisian Poultry Yard (B L.)	9	9
126	J. Ferguson (Lang.)	23	39				
128	A. S. Walters (B.R.)	12	36	121	Parisian Poultry Yard (B.L.)	9	9
125	J. Ferguson (Lang.)	22	23	129	R. A. Girling (Min.)	0	4
130	R.A. Girling (Min.)	11	17	124	J. Ferguson (Anc.)	0	1
127	A. S. Walters (B R.)	10	16	132	W. H. Forsyth (S.W.)	0	0

ZILLMERE EGG-LAYING COMPETITION FOR JUNE.

Two thousand and fifty-three eggs were laid during June, being an average of 15.55 eggs per bird for the month. The health of the birds generally was very good. Nos. 10 and 58 had bowel trouble and were replaced; there were only two other minor ailments. As is usual in the early months of the competition, the heavy breeds showed a slight advantage over the light varieties. The average for June in the Black Orpington section was 17, against 15½ in the White Leghorns.

WHITE LEGHORNS.

Pen No.	Owner.	June.	Total.
62	Miss L. M. Dingle	25	77
14	Enroh Pens	25	70
75	W. Shaffrey	24	70
15	W. J. Berry	24	69
8	Oakleigh, P. F.	23	66
27	H. T. Britten	21	61
66	R. Duff	20	61
72	W. H. Forsyth	20	61
13	Enroh Pens	21	60
64	S. Lloyd	20	60
50	J. Harrington	21	59
61	Miss L. M. Dingle	19	59
65	R. Duff	22	59
81	J. E. G. Purnell	20	59
48	R. D. Chapman	20	58
49	J. Harrington	20	58
16	W. J. Berry	19	57
18	A. W. Ward	20	57
41	W. Wakefield	16	57
22	M. F. Newberry	16	56
33	A. S. Walters	14	56
76	W. Shaffrey	20	56
30	W. and G. W. Hindes	20	55
3	T. H. Craig	20	54
40	J. Earl	11	54
7	Oakleigh Poultry Farm	20	53
51	Kidd Bros.	22	53
28	H. T. Britten	20	52
54	H. Holmes	22	51
70	R. Shaw	20	51
38	T. Williams	19	50
55	G. A. Baxter	18	50
42	W. Wakefield	5	49
43	Kelvin P.F.	11	49
4	T. H. Craig	22	48
26	E. Stephenson	20	48
59	G. Scaletti	23	48
84	L. Anderson	21	47
19	W. Witt	21	45
20	W. Witt	15	45
29	W. and G. W. Hindes	20	45
57	H. Fraser	17	45
1	Carinya P.F.	22	44
31	H. Needs	11	44
71	W. H. Forsyth	20	44
56	G. Baxter	18	43
69	R. Shaw	20	43
45	F. R. Koch	6	41
63	S. Lloyd	19	41
37	G. Williams	16	40
73	A. Hodge	21	40
2	Carinya P.F.	15	39
25	E. Stephenson	17	39
36	J. T. Webster	7	39
35	J. T. Webster	12	38
74	A. Hodge	15	38
77	W. Smith	19	35
5	P. J. Fallon	17	34
11	A. Neil	19	34
12	A. Neil	19	34
32	H. Needs	12	34
78	W. Smith	19	33
23	Parisian P.F.	17	31
34	A. S. Walters	13	30
53	H. Holmes	8	30
46	F. R. Koch	18	29
67	J. and G. Green	9	29
39	J. Earl	7	28
44	Kelvin P.F.	5	27
83	L. Andersen	18	27
85	A. Cowley	20	27
6	P. J. Fallon	7	25
24	Parisian P.F.	1	25
17	A. W. Ward	9	24
47	R. D. Chapman	17	19
21	M. F. Newberry	11	16
68	J. and G. Green	3	14
58	H. Fraser	11	11
79	W. Bliss	2	11
80	W. Bliss	6	11
10	R. C. J. Turner	9	9
86	A. Cowley	2	8
9	R. C. J. Turner	0	4
60	G. Scaletti	4	4
82	J. E. G. Purnell	0	1
52	Kidd Bros.	0	0

BLACK ORPINGTONS.

Pen No.	Owner.	June.	Total.
95	J. Potter	26	83
92	J. Pryde	25	74
112	H. M. Chaille	23	71
119	J. Harrington	20	67
102	Enroh Pens	19	65
115	C. C. Dennis	26	65
113	E. Walters	23	63
120	J. Harrington	23	62
104	L. Pritchard	23	60
96	J. Potter	12	56
109	T. Brotherton	24	56
89	K. Macfarlane	10	52
107	E. F. Dennis	25	52
105	W. Smith	19	46
110	T. Brotherton	20	46
93	H. B. Stephens	24	45
117	E. C. Raymond	23	45
101	Enroh Pens	24	44

ZILLMERE EGG-LAYING COMPETITION—*continued.*

BLACK ORPINGTONS—*continued.*

Pen No.	Owner.	June.	Total.	Pen No.	Owner.	June.	Total.
111	H. M. Chaille	15	44	114	E. Walters	22	33
118	E. C. Raymond	21	41	88	Parisian P.Y.	0	30
99	S. Donovan	4	39	94	H. B. Stephens	7	26
106	W. Smith	12	38	98	W. Shaffrey	0	23
108	E. F. Dennis	18	38	90	K. Macfarlane	20	21
91	J. Pryde	8	37	103	L. Pritchard	9	19
116	C. C. Dennis	24	37	97	W. Shaffrey	5	12
87	Parisian P.Y.	22	33	100	S. Donovan	0	9

OTHER VARIETIES.

Pen No.	Owner.	June.	Total.	Pen No.	Owner.	June.	Total.
131	W. H. Forsyth (S.W.)	27	68	123	J. Ferguson (Ancona)	11	21
126	J. Ferguson (Lang.)	21	60	121	Parisian P.Y. (B.L.)	0	9
128	A. S. Walters (B.R.)	23	59	124	J. Ferguson (Ancona)	6	7
125	J. Ferguson (Lang.)	21	44	129	R. A. Girling (Min.)	0	4
122	Parisian P.Y. (B.L.)	18	27	132	W. H. Forsyth (S.W.)	0	0
127	A. S. Walters (B.R.)	7	23				
130	R. A. Girling (Min.)	5	22			2,053	5,431

TOOWOOMBA COMPETITION.

Following is the result of the egg-laying competition which is being held under the auspices of the N.U.P.B.A., Toowoomba Branch, at Charlsmith Farm, South street, Toowoomba:—

WHITE LEGHORNS.

No.	Owner.	Total.	Monthly Score.	No.	Owner.	Total.	Monthly Score.
53	C. A. Keen	75	25	3	J. H. Jones	52	25
13	D. H. Dippel	74	23	17	G. Laurenson	49	14
1	J. Hutton	70	23	18	W. Laurenson	48	18
2	J. Hutton	70	24	57	J. W. Newton	46	14
15	R. Cole	70	21	33	Mrs. H. Bliss	46	7
48	H. Mansbridge	69	22	47	H. Mansbridge	46	16
56	Enroh Pens	69	21	26	W. S. Adams	43	22
14	D. H. Dippel	67	21	28	E. Wiles	42	21
37	Parisian P.Y.	67	22	19	R. W. Shaw	40	15
10	W. Hindes	67	16	49	A. R. Petty	39	4
16	R. Cole	66	21	27	E. Wiles	37	11
54	C. A. Keen	66	21	52	A. Walker	37	3
7	G. Stilton	63	21	25	W. S. Adams	36	21
51	A. Walker	62	13	46	R. J. C. Turner	34	6
4	J. H. Jones	61	18	38	Parisian P.Y.	30	0
44	P. J. Fallon	61	19	35	H. Manning	29	24
5	W. Grant	60	22	45	R. J. C. Turner	28	20
20	R. W. Shaw	60	20	34	Mrs. H. Bliss	27	3
50	A. R. Petty	59	22	58	J. W. Newton	25	0
8	G. Stilton	58	20	43	P. J. Fallon	20	4
9	W. Hindes	58	20	55	Enroh Pens	18	18
6	W. Grant	55	12	41	S. McBean	15	8
12	S. Chapman	55	19	23	J. Goggins	13	1
21	J. W. Short	55	15	59	G. E. Rogers	13	2
11	S. Chapman	54	15	39	V. Brand	12	12
22	J. W. Short	54	21	31	J. Taylor	10	6
30	W. Cummings	54	6	32	J. Taylor	5	0
29	W. Cummings	54	9	42	S. McBean	4	4
36	H. Manning	53	25	40	V. Brand	3	0
24	J. Goggins	53	17	60	G. E. Rogers	0	0

TOOWOOMBA COMPETITION—*continued.*

BLACK ORPINGTONS.

No.	Owner.	Total.	Monthly Score.	No.	Owner.	Total.	Monthly Score.
111	T. J. Carr	81	29	89	W. Wilson	56	23
121	J. Hutton	81	29	113	Ken. McFarlane	55	17
112	T. J. Carr	79	27	101	R. W. Shaw	52	22
88	Marville P.Y.	79	22	87	Marville P.Y.	52	10
127	E. Walters	77	27	105	R. Rivett	51	24
95	T. C. Ollier	76	24	104	E. F. Dennis	51	22
97	R. Burns	75	27	124	G. E. Rogers	48	26
131	H. B. Stephens	72	25	102	R. W. Shaw	45	20
122	J. Hutton	72	25	123	G. E. Rogers	43	23
86	T. J. Moloney	72	23	85	T. J. Moloney	39	8
90	W. Wilson	70	25	96	T. C. Ollier	39	0
103	E. F. Dennis	70	22	92	S. H. K. Champion	36	25
116	Cliff Lavers	69	24	120	Parisian P.Y.	34	1
132	H. B. Stephens	68	21	106	R. Rivett	32	21
107	R. Holmes	67	26	130	G. Radford	30	4
117	L. E. Maund	67	23	99	Mrs. G. H. Kettle	29	21
125	C. C. Dennis	66	26	91	S. H. K. Champion	29	21
83	Woombo P.Y.	65	24	119	Parisian P.Y.	29	21
128	G. Walters	63	21	93	H. Mansbridge	29	8
115	Cliff Lavers	62	21	129	G. Radford	26	19
94	H. Mansbridge	61	25	98	R. Burns	23	23
109	D. H. Dippel	61	18	100	Mrs. G. H. Kettle	22	6
84	Woombo P.Y.	60	22	108	R. Holmes	15	15
114	Ken. McFarlane	58	23	118	Mrs. L. Maund	3	2
110	D. H. Dippel	57	16	126	C. C. Dennis	3	3

OTHER BREEDS.

No.	Owner.	Total.	Monthly Score.	No.	Owner.	Total.	Monthly Score.
76	W. Becker (Ch. Lang.)	68	24	65	J. W. Short	12	12
73	H. Dibbs (Ch. Lang.)	66	19	71	J. W. Allatt (Camp.)	54	18
75	W. Becker (Ch. Lang.)	53	21	72	J. W. Allatt (Camp.)	5	5
74	H. Dibbs (Ch. Lang.)	46	12	82	C. G. Warrian (B.R.)	55	15
64	T. J. Carr (S.W.)	61	19	81	C. G. Warrian (B.R.)	44	19
63	T. J. Carr (S.W.)	55	20	77	W. Paulsen (B.R.)	21	21
68	R. W. Shaw (B.L.)	62	20	78	W. Paulsen (B.R.)	6	6
67	R. W. Shaw (B.L.)	55	20	79	A. LePla (R.I.R.)	41	19
66	J. W. Short (B.L.)	43	22	80	A. LePla (R.I.R.)	2	2
69	Parisian P.Y.	14	14	62	Mrs. L. Maund (Cl. W.)	21	0
70	Parisian P.Y.	12	12	61	Mrs. L. Maund (Cl. W.)	14	14

FODDER CONSERVATION.

Referring to a Press telegram from Warwick, to the effect that in view of the state of the finances and the opposition of Local Producers' Associations, the Government had decided not to proceed with the proposed scheme for fodder conservation, the Minister for Agriculture and Stock (Hon. W. N. Gillies) said, in the course of recent Press interview, that this was incorrect as the Government had not yet given full consideration to the scheme put forward by the Council of Agriculture, which involved an expenditure of £2,500,000. The Council of Agriculture itself, however, came to a decision at its last meeting—which decision was influenced by the fact that only twenty-eight out of the 107 Local Producers' Associations favoured the larger scheme, and sixty-eight of them favoured the storage on the farm and more liberal advances under the Advances to Settlers Act for this purpose. This idea was favoured by himself, as the one for immediate consideration, continued Mr. Gillies. The Government, however, recognised that the conservation of fodder and the conservation of water were national matters that must ultimately be dealt with in a national way.

CREAM GRADING.

(*Points of a Paper read by Mr. C. McGrath, Instructor in Dairying, Department of Agriculture and Stock, before Dairy Factory Managers' Conference at Brisbane, 31st May,* 1923.)

In co-operation with the Dairying Industry Advisory Board the Dairy Factory Managers' Association can engage in a work of real national service, for just to the extent to which we improve quality and increase output do we enrich the State, and enable it to carry its post war burdens. It may be said, however, that dairying pays quite as well, and perhaps even better, than general agriculture. One generally finds that depression when it occurs is less felt in districts largely devoted to dairying. The dairy farmer is the pioneer of close settlement throughout this State. A sure sign of stability, and a sight that inspires confidence, is a herd of good dairy cows, on a well laid out dairy farm. The dairy cow made possible the successful settlement of many now prosperous areas in the State, extending along the coastal belt from the Tweed to the Atherton Tableland. The industry is extending northwards. Last year I saw some 200 dairy heifers intended as foundation dairy stock on the Daintree River. In the Northern Peninsula are vast areas of scrub-covered flats, and tablelands of rich soil, well watered, sound dairy country awaiting development.

A Healthy Cow Delivers the Goods.

The healthy dairy cow, properly cared for, delivers the goods of an A1 quality. Deterioration, if any, occurs as soon as the dairy farmer takes delivery. The quality of the cream is no better and no worse than the quality of the milk from which it was separated. In order to produce A1 cream, attention must be given to the production and handling of the milk, and the separation, handling, and delivery of the cream on the factory floor. The quality of the butter produced is dependent upon the quality of the cream, the care, attention, and skill of the buttermaker. The factory manager who wants to place his factory output in the highest grades must have high-grade cream to work with.

Cream Grading.

Cream grading is the all important factor in determining the quality of the output. In the grading of milk or cream, or any of its products, it is essential that the grader should have his faculties trained so as to be able to fully appreciate the natural influences of odour and flavour of a first-grade dairy product, be it milk, butter, or cheese. The full natural flavour of carefully produced and well-handled milk, and its product cream, appeals to the senses of a trained grader. The cream grader and buttermaker should keep in close touch to secure the best results of their co-operative efforts. The position of grader is one of great responsibility. He must carry out his duties expeditiously and exactingly. As the lid is removed from each can on the receiving floor, the grader brings to his assistance the senses trained specially for his work by years of practical experience. He notes the condition and general appearance of each cream supply, both can and contents—cans that are rusted, dinted, or open seamed do not appeal to him as suitable containers for cream from which A1 butter can be manufactured. The surface appearance of the cream catches his eye. The presence of flies, insects, and particles of dirt is an indication of neglect. The presence of moulds seriously affects the quality of the cream, and may give rise to "fishiness" or moulds in butter produced therefrom, and points to unsuitable conditions surrounding production and storage.

A hard tough covering on the surface points to neglect in stirring the cream. A frothy or aerated surface gives rise to a suspicion that separation has taken place into the cream can direct, or is the result of neglect of necessary stirring. An accumulation of gas bubbles on the surface is the result of the action of gas-forming bacteria yeast cells, *bacillus Coli communa*. When placing the cream samples and stirrer in the cream if a grader finds a hard, tough layer within the body of the cream, he concludes that the cream has been delivered direct from the separator into the can at each time of separation, a practice that cannot be too strongly condemned.

Hard tough portions throughout the body of the cream is an indication of want of mixing and careful stirring. Curdling is caused by separating cream with a fat content below the standard, or allowing warm cream to flow from the separator to mix with the product of a previous separation, or by the mixing of warm and cold cream.

Partial churning of cream directs the grader's attention to the butter-fat test of the supply, and if below the standard the supplier's attention is called to it. The use of cans of suitable capacity, so that each delivery will fill a can, or cans, or the use of a tin float is serviceable where cream is conveyed long distances by road. Ropiness is generally associated with the use of insanitary water, which gives rise to the micro organisms producing this defect. Slimy condition denotes the presence

of undesirable organisms, while in isolated cases it has been traced to the fodder consumed. The body of the cream is noted by the grader. A1 cream has an even body with the consistency of a well-mixed paint, of a bright appearance. An over-ripe cream is dull in colour, due to the action of putrefactive organisms breaking down the milk solids.

The Grader's Work.

The grader's sense of sight has done its work. His faculties of smell and taste have been called to his aid. The odour of a first grade cream that has taken on a clean acid flavour, but has not attained an overripe condition, appeals to the grader's sense of smell. The grader will have noted undesirable odours such as an unclean, disagreeable odour found in the produce of unhealthy cows. A stable or yard odour is detected in cream produced under insanitary conditions, such as dirty yards and bails, from which droppings have not been removed. Overripe supplies will have attained a strong acid, vinegar, rancid, and stale taste, due to the presence of undesirable organisms associated with insanitary production and handling methods. Feed odours are found in cream produced by cows fed on foods that impart strong flavours to the milk and cream, such as turnip, rape, and green lucerne. Undesirable odours are also imparted by varieties of herbs and weeds which grow in our pastures at periods of the year. Aeration benefits, but does not remove strong feed flavours. Flavour is the all important characteristic that determines the grade and value of the cream and butter. The grader must have a keen sense of taste, developed and trained by practical dairy factory work, so as to enable him to detect and appreciate the clean, full, natural flavour of an A1 cream. He will discern by flavour the following defects: unclean, overacid state, vinegar, rancid, tallowy, musty, woody butter, metallic, also food flavour defects. Cream may also absorb oil flavours from milking machines if proper care is not exercised by the operator. In factory practice the cream is graded into three classes—A1, 1, and 2.

Cream Classification.

An A1 cream must have a clean, full-matured flavour, and odour either sweet or of a pleasant acid flavour, showing no curd particles, and of a smooth, even consistency. No. 1 cream comprises cream in over-ripe condition, but possessing true lacic acid flavour, of a smooth, even consistency, and cream sour or sweet, slightly off or strong in flavour, and of a smooth, even consistency. No. 2 is the classification for all cream that, in the opinion of the grader, does not possess the qualities and character to enable it to qualify for a higher grade. Some hundreds of supplies are handled and graded in a day's work during a normal season. Let us analyse the results obtained by various factories and we find that the percentage of A1 grades varies from 68 per cent. to 98 per cent., a difference of 30 per cent. in amount of A1 cream received by butter factories operating in different areas. Is the full blame for this high percentage of low-grade cream to be placed on the shoulders of the dairy farmers? In my opinion this is not so. Any one district or locality has not a monopoly of up-to-date, painstaking dairy farmers. I have met progressive dairy farmers in all parts of this State where the dairying industry has been established. I ask practical men to call to mind butter factories that have an output of A1 butter of from 90 per cent. to 100 per cent. of its entire output. Note the location of the factory, study its environment, and it will generally be found that such a factory is located in a district devoted chiefly to dairying. Facilities for quick and frequent communications with factory are provided. Deliveries of cream are never less frequent than three or four weekly, and often daily.

Where Time Tells.

The factory with the lower percentage of A1 cream is not so satisfactorily served. Supplies are drawn from long distances by road to rail, and in consequence periods from twelve to twenty hours elapse from the time the cream leaves the farm until it reaches the factory, and the quality is much impaired in consequence. Cream of third class is generally of a very inferior quality. It is difficult for a grader to class it. The more one looks at it the worse it appears; the more one smells it the sicker one gets. If the dairy cows that produced this grade only smelt the product the herd would go on strike or dry up.

Co-operation Between Farm and Factory.

The percentage of third class cream is, happily, gradually diminishing, and we look forward to the day when it will be necessary to have two classes only for cream received by all butter factories. To reach that position managers must have the assistance of the dairy farmers, and they must support the farmers in turn. The farmers are not dairying for any other purpose than to make a profit. The majority are always ready to improve their methods and to take advantage of facilities offering, so as to deliver cream of an A1 quality. We must take a wide view of the

varied conditions associated with the production, handling, and delivery of cream at factories.

The provisions of the Dairy Produce Act safeguard the production and handling of cream, and when complied with the benefits are realised. The matter of delivery from farm to factory calls for assistance from one and all who are interested in the welfare of this great industry. We must ensure more frequent deliveries of cream. Our help must be extended to dairy farmers distantly located from rail, and to those situated along branch railways where the train service does not allow of regular and frequent deliveries. Insulated cream cars suitably iced could be made available during summer months for suppliers using the railway. Organisation of supplies to factories on zone system deserves consideration. To each factory should be allotted such dairying areas that offer facilities to the producers to reach such factory regularly, and with the least possible delay and expense. To keep before the mind of producers, and others handling dairy produce, the necessity of protecting cream from sun rays and heat, I suggest that suppliers' consignment tags, as supplied by the dairy factories, have printed on their face in red, the words "Protect against sun's rays and heat." The words to be printed in large letters, of light or dotted lines, so as not to interfere with the reading of the address. In the cleansing of cream cans I obtained excellent results from spraying or rinsing with chloride of lime solution after the cans leave the steriliser. Cans so treated smell sweet and clean, and are free from the "off odour" that one detects in cans that have been lidded down for some hours.

The full benefits of grading are attained only when the results of the work carried out on the factory grading floor are brought under the notice of the interested suppliers, and I suggest the issue of a grade card setting out defects in cream supplied and offering suggestions with a view to assisting the producer to obtain an A1 standard, to suppliers of cream below A1 quality. The following form might prove generally acceptable:—

SPECIMEN GRADE SHEET.

QUEENSLAND DEPARTMENT OF AGRICULTURE AND STOCK.

Dairy Branch, , 1923.

DEAR SIR,—

This Grade Sheet is forwarded with the desire to point out clearly to you the defects in your cream; and to offer suggestions for remedying such defects, so that the quality of the product may attain an A1 standard, to the mutual benefit of yourself and your factory.

GRADE CARD.

The cream delivered by you to factory on , 192 , was and not in a suitable condition to produce an A1 Butter. The following suggestions may assist you:—

DEFECTS AND PREVENTION.

Over-ripe, Stale, Rancid.—Cool cream as low as possible immediately after separation. Keep cream in cool clean surroundings. Do not mix hot and cold cream together. Stir cream occasionally. Scald utensils. Deliver more regularly to factory.

Cowy.—Keep milking sheds clean. Remove droppings daily from shed. Remove milk to separating room as soon as milked. Store cream in clean surroundings.

Gassy or Fermented.—Wash cow's udder before milking. Keep out of milk hairs and particles of dirt. Strain milk immediately after milking. Do not allow cows to drink or wade in bad water. Do not use rusty utensils. Cool cream and stir.

Tallowy.—Do not expose milk or cream to high temperature or direct rays of the sun.

Unclean.—Keep separator and utensils clean and well scalded. Do not use milk of newly calved cows or unhealthy cows or cows suffering from inflamed udders.

Roapy.—Keep utensils thoroughly cleaned and well scalded. Do not allow dairy cows to drink or wade in bad water.

Food Flavours and Weedy.—Do not feed highly flavoured foods immediately before or at time of milking. When possible remove dairy herds from fields where pastures give rise to strong flavours.

Absorbed Odours and Flavours.—Do not allow milk or cream to come in contact with odour of paint, engine oil, oil gas disinfectants, fruit, vegetables, &c.

Curdy.—Adjust separator to deliver cream of standard test. Do not mix hot and cold creams.

Pasteurisation.

Pasteurisation of cream has brought about a marked improvement in the quality of the butter produced. The process enables the manufacturer to produce a more uniform grade, and improves storing qualities. We must, however, avoid over estimating the influence of pasteurisation in eliminating defects met with in cream. Pasteurisation expels from the cream vapours and gases, and removes volatile substances and flavours absorbed by cream. A cream grader's experience enables him to class his cream for pasteurisation, so that the best results are obtained for the producer, and the factory's reputation is safeguarded. A knowledge of dairy bacteriology is essential. The grader realises that the lactic acid bacteria are found in cream produced under sanitary conditions, and control the changes that take place in cream having a pronounced clean lactic acid flavour. A cream not having this characteristic would be considered over-ripe for the production of A1 grade butter. Unclean, fermented, stale, rancid, slimy, and curdled cream cannot, by the process of pasteurisation, be converted into an A1 butter. Experience makes a grader familiar with the chief defects met with in factory cream supplies, and also with defects due to localised conditions pertaining to soil, climate, food, &c. A sustained co-operative effort will result in an improvement of the quality of the butter produced, a matter as vital to the State as is the increase of our exports. It costs as much to manufacture, provide boxes, &c., for second grade as for first grade butter. The expenses of railage, freezing, storage, and shipping are the same for all grades. It is, therefore, evident that the higher the grade the greater the value on the overseas market, the lower will be the percentages of expenses incurred in placing the commodity on the market. If all had been as good as the best, then the dairy farmers would have received many thousands of pounds more for their product, and the distributors would have something satisfactory to handle. Let the slogan of all connected with the Queensland Dairying Industry be, "All can be made as good as the best," and with the aid of big co-operative and persistent effort may the industry progress and reach that stage when we can say of our butter production, "All is as good as the best." Then the dairy industry will take its proper place as the premier branch of agriculture.

A SUMMARY OF SOME EXPERIMENTS CARRIED OUT BY THE BUREAU OF SUGAR EXPERIMENT STATIONS.—VII.

The Director of Sugar Experiment Stations, Mr. H. T. Easterby, commenced this series in the May (1922) Journal, and in his opening article discussed deep cultivation experiments and tabulated comparative crop result from subsoiled and non-subsoiled fields. The second instalment, an account of results of irrigation experiments and the action of irrigation and manures upon the density and purity of sugar juices, appeared in the June (1922) issue. In the August number Mr. Easterby's notes covered experiments in fertilisation, and were followed in the succeeding issue by an account of distance experiments and resultant crops. In the October (1922) number the summary was continued with notes on the introduction and testing of cane varieties. In the February Journal experiments to determine if cane sets cut from arrowed canes have a prejudicial effect on the germination and subsequent yield were discussed. In his introduction to the Summary of Experiments above mentioned, the Director stated that a summary of the chemical work accomplished by the Bureau, to be prepared by Mr. George R. Patten, formerly Chief Chemist to the Bureau, would also be presented. Mr. Patten has now completed this summary, which entailed a great deal of elaborate work and occupied much time. The results will appear from time to time in the Journal until complete, when the whole summary will then be published in bulletin form.—Ed.

SOIL AND OTHER CHEMICAL ANALYSES—*continued.*

Summarised by GEORGE R. PATTEN, Analyst, Agricultural Laboratory, Brisbane, formerly Chief Chemist, Bureau of Sugar Experiment Stations.

The following summary includes the remainder of Series III.—Bundaberg Soils.

It will be noticed that the full chemical names of soil constituents are given in the first table. In the remaining tables, in order to save space and time, the chemical symbols are used, but the layman can easily make these out on reference to the first table.

The lime content in these soils is much better on the average in these series of soils than they were in Series I.—Cairns Soils.

SERIES No. III—*continued.*

SHARON, KALBAR, OAKWOOD, BONNA.

Constituent Element.	Agricultural Analysis.	Insoluble Residue. Insoluble in Hydrochloric Acid.	Absolute Analysis. Water-free Soil.	Absolute Analysis. Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	80·40	..	..	..
Moisture	1·74	..	..	..
Combustible matter ..	5·87	..	5·97	..
Silica (SiO_2) insoluble ..	..	76·64	62·71	66·72
Silica (SiO_2) soluble	...	12·63	10·33	10·99
Phosphoric acid (P_2O_5) ..	·12	·14	·24	·26
Chlorine (Cl.)	·003	..	·003	·003
Iron oxide (Fe_2O_3)	4·23	1·19	5·26	5·59
Alumina (Al_2O_3)	6·34	5·21	10·71	11·40
Lime (CaO)	·54	·51	·97	1·03
Magnesia (MgO)	·39	·22	·58	·61
Potash (K_2O)	·19	·84	·88	·94
Soda (Na_2O)	·08	2·08	1·78	1·89
	99·90	99·46	99·43	99·43

Acidic elements in the soils .. .. 77·97 per cent.
Basic elements in the soils .. .. .. 21·46 per cent.
Total nitrogen in the soils .. .. .. ·119 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

—	Per Cent.	Lb. Per Acre.
Phosphoric acid (P_2O_5)	·0025	75
Lime (CaO)	·1310	3,930
Potash (K_2O)	·0337	1,011

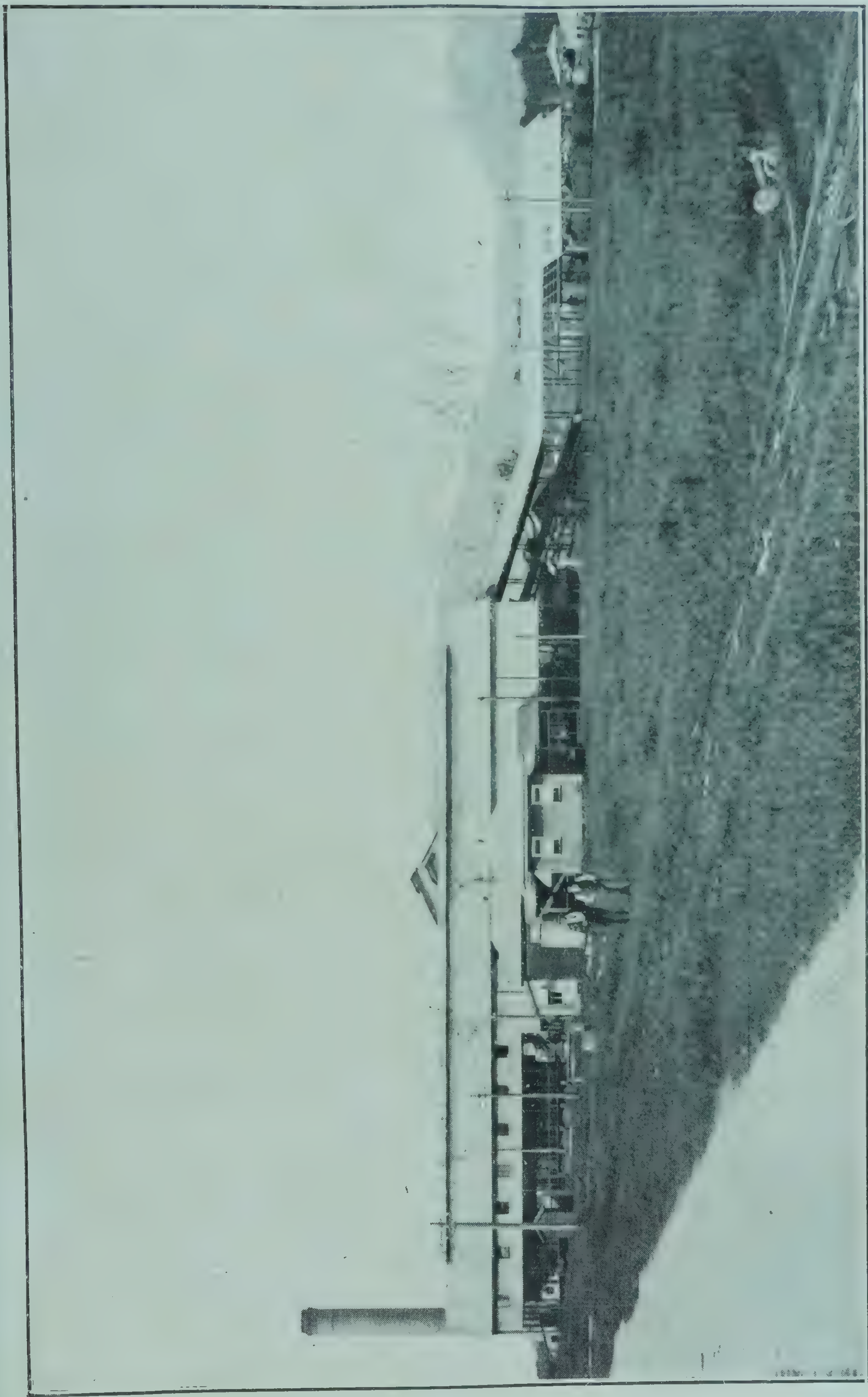


Plate 1.—Babinda Central Sugar Mill.

FAIRYMEAD.

Constituent Element.	Agricultural Analysis.	Insoluble Residue. Insoluble in Hydrochloric Acid.	Absolute Analysis. Water-free Soil.	Absolute Analysis. Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	71·60	..	..	..
Moisture	3·40	..	..	..
Combustible matter	9·10	..	9·42	..
SiO_2 (insoluble)	..	72·20	53·51	59·08
SiO_2 (soluble)	..	13·66	10·13	11·18
P_2O_5	·48	·14	·59	·65
Cl.	·003	..	·003	·003
Fe_2O_3	4·90	2·27	6·75	7·46
Al_2O_3	8·38	6·98	13·85	15·29
CaO	·51	·74	1·08	1·19
MgO	·74	·33	1·01	1·12
K_2O	·47	1·54	1·62	1·79
Na_2O	·19	2·62	2·13	2·35
	99·77	100·48	100·09	100·11

Acidic elements in the soils .. .. 70·91 per cent.
Basic elements in the soils .. .. .. 29·20 per cent.
Total nitrogen in the soils .. .. .. ·133 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lb. Per Acre.
Phosphoric acid (P_2O_5)	·0015	45
Lime (CaO)	·1086	3,258
Potash (K_2O)	·0235	705

WATERVIEW.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	72·49	..	..	..
Moisture	2·96	..	..	..
Combustible matter	8·17	..	8·41	..
SiO_2 (insoluble)	..	72·79	54·35	59·35
SiO_2 (soluble)	..	12·72	9·50	10·37
P_2O_5	·14	·13	·24	·26
Cl.	·004	..	·004	·004
Fe_2O_3	5·54	1·08	6·51	7·11
Al_2O_3	8·08	8·89	14·96	16·33
CaO	1·11	·80	1·74	1·89
MgO	·67	·30	·91	1·00
K_2O	·45	1·31	1·45	1·58
Na_2O	·19	2·32	1·92	2·10
	99·80	100·34	99·99	99·99

Acidic elements in the soils .. .. 69·98 per cent.

Basic elements in the soils .. .. .. 30·01 per cent.

Total nitrogen in the soils .. .. .. ·153 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

—	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0106	318
Lime (CaO)	·2391	7,173
Potash (K_2O)	·0441	1,323

AVONDALE (INCLUDING MIARA).

Constituent Element.	Agricultural Analysis.	Insoluble Residue. Insoluble in Hydrochloric Acid.	Absolute Analysis. Water-free Soil.	Absolute Analysis. Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	73·38	..	..	..
Moisture	3·52	..	..	..
Combustible matter	9·95	..	10·31	..
SiO_2 (insoluble)	..	74·31	56·52	63·03
SiO_2 (soluble)	..	10·69	8·13	9·07
P_2O_5	·28	·09	·35	·39
Cl.	·04	..	·04	·04
Fe_2O_3	5·06	1·80	6·61	7·38
Al_2O_3	6·18	9·03	13·28	14·81
CaO	·47	·85	1·23	1·38
MgO	·50	·47	·88	·98
K_2O	·33	·79	·94	1·05
Na_2O	·30	1·53	1·47	1·64
	100·01	99·56	99·76	99·77

Acidic elements in the soils .. .. 72·53 per cent.
Basic elements in the soils .. .. .. 27·24 per cent.
Total nitrogen in the soils .. .. .. ·229 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lb. Per Acre.
Phosphoric acid (P_2O_5)	·0021	63
Lime (CaO)	·1395	4,185
Potash (K_2O)	·0327	981

INVICTA.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	75·22	..	..	..
Moisture	2·58	..	..	..
Combustible matter	8·53	..	8·76	..
SiO_2 (insoluble)	..	75·40	58·22	63·81
SiO_2 (soluble)	..	11·82	9·13	10·00
P_2O_5	·22	·11	·31	·34
Cl.	·004	..	·004	·004
Fe_2O_3	5·35	2·41	7·35	8·06
Al_2O_3	6·93	6·58	12·20	13·37
CaO	·36	·78	·97	1·06
MgO	·35	·46	·73	·80
K_2O	·23	·58	·69	·76
Na_2O	·13	2·00	1·68	1·84
	99·90	100·14	100·04	100·04

Acidic elements in the soils .. .. 74·15 per cent.
Basic elements in the soils .. .. .. 25·89 per cent.
Total nitrogen in the soils .. .. .. ·206 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

—	Per Cent.	Lb. Per Acre.
Phosphoric acid (P_2O_5)	·0031	93
Lime (CaO)	·1028	3,084
Potash (K_2O)	·0321	963

GOOBURRUM.

Constituent Element.	Agricultural Analysis.	Insoluble Residue. Insoluble in Hydrochloric Acid.	Absolute Analysis. Water-free Soil.	Absolute Analysis. Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	86·93	..	..	..
Moisture	·79	..	..	..
Combustible matter	4·46	..	4·49	..
SiO_2 (insoluble)	..	89·20	78·16	81·84
SiO_2 (soluble)	..	5·89	5·16	5·40
P_2O_5	·13	·07	·19	·20
Cl.	·002	..	·002	·002
Fe_2O_3	2·58	·49	3·03	3·17
Al_2O_3	4·21	2·72	6·63	6·94
CaO	·17	·41	·53	·55
MgO	·15	·34	·44	·46
K_2O	·12	·34	·42	·44
Na_2O	·06	·73	·69	·72
	99·60	100·19	99·74	99·72

Acidic elements in the soils .. .. .. 87·44 per cent.

Basic elements in the soils .. .. .. 12·28 per cent.

Total nitrogen in the soils .. .. .. ·129 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

—	Per Cent.	Lb. Per Acre.
Phosphoric acid (P_2O_5)	·0006	18
Lime (CaO)	·0680	2,040
Potash (K_2O)	·0292	876

PIALBA.

Constituent Element.	Agricultural Analysis.	Insoluble Residue. Insoluble in Hydrochloric Acid.	Absolute Analysis. Water-free Soil.	Absolute Analysis. Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	76·77	..	..	..
Moisture	3·49	..	..	..
Combustible matter	8·02	..	8·26	..
SiO_2 (insoluble)	..	82·50	65·67	71·55
SiO_2 (soluble)	..	9·20	7·30	7·96
P_2O_5	·15	·09	·23	·25
Cl.	·004	..	·004	·004
Fe_2O_3	3·94	1·55	5·33	5·78
Al_2O_3	6·99	4·10	10·51	11·47
CaO	·20	·37	·40	·55
MgO	·25	·54	·69	·75
K_2O	·14	·26	·35	·38
Na_2O	·12	1·63	1·40	1·52
	100·07	100·24	100·14	100·21

Acidic elements in the soils .. .. 79·76 per cent.

Basic elements in the soils .. .. .. 20·45 per cent.

Total nitrogen in the soils .. .. .. ·193 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID

——	Per Cent.	Lb. Per Acre.
Phosphoric acid (P_2O_5)	·0008	24
Lime (CaO)	·0506	1,518
Potash (K_2O)	·0187	561

NERANG.

Constituent Element.	Agricultural Analysis.	Insoluble Residue. Insoluble in Hydrochloric Acid.	Absolute Analysis. Water-free Soil.	Absolute Analysis. Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	69·90	..	..	..
Moisture	4·36	..	..	..
Combustible matter	8·89	..	9·29	..
SiO_2 (insoluble)	..	72·62	53·07	58·53
SiO_2 (soluble)	..	8·47	6·19	6·83
P_2O_5	·29	·16	·47	·46
Cl.	·003	..	·003	·003
Fe_2O_3	5·13	3·17	7·68	8·47
Al_2O_3	9·43	10·56	17·58	19·39
CaO	·65	·75	1·23	1·35
MgO	·83	·42	1·18	1·30
K_2O	·31	1·32	1·38	1·57
Na_2O	·20	2·20	1·76	1·95
	99·99	99·67	99·83	99·75

Acidic elements in the soils .. .. 65·82 per cent.
Basic elements in the soils .. .. .. 33·93 per cent.
Total nitrogen in the soils .. .. .. ·199 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lb. Per Acre.
Phosphoric acid (P_2O_5)	·0016	40
Lime (CaO)	·1356	3,390
Potash (K_2O)	·0404	1,010

MOUNT BAUPLE (RED SOILS).

Constituent Element.	Agricultural Analysis.	Insoluble Residue. Insoluble in Hydrochloric Acid.	Absolute Analysis. Water free Soil.	Absolute Analysis. Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	73·06	..	..	..
Moisture	2·45	..	..	..
Combustible matter	8·09	..	8·24	..
SiO_2 (insoluble)	..	83·54	62·57	68·22
SiO_2 (soluble)	..	8·91	6·67	7·32
P_2O_5	·17	·16	·35	·39
Cl.	·003	..	·003	·003
Fe_2O_3	4·92	·85	5·68	6·20
Al_2O_3	10·47	4·68	14·21	15·49
CaO	·32	·24	·45	·49
MgO	·26	·12	·35	·39
K_2O	·10	·29	·32	·35
Na_2O	·09	·95	·81	·88
	99·93	99·74	99·65	99·73

Acidic elements in the soils .. .. 75·93 per cent.

Basic elements in the soils .. .. .. 23·80 per cent.

Total nitrogen in the soils .. .. .. ·140 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

—	Per Cent.	Lb. Per Acre.
Phosphoric acid (P_2O_5)	·0006	18
Lime (CaO)	·0946	2,838
Potash (K_2O)	·0233	699

MOUNT BAUPLE (GREY SOILS).

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	81·33	..	..	..
Moisture	2·28	..	..	..
Combustible matter	6·51	..	6·66	..
SiO_2 (insoluble)	..	86·27	71·81	76·92
SiO_2 (soluble)	..	6·91	5·75	6·15
P_2O_5	·18	·13	·30	·32
Cl.	·004	..	·004	·004
Fe_2O_3	2·86	·71	3·53	3·78
Al_2O_3	6·01	4·18	9·63	10·32
CaO	·26	·27	·49	·53
MgO	·24	·24	·45	·48
K_2O	·18	·41	·53	·57
Na_2O	·12	1·21	1·13	1·21
	99·97	100·33	100·28	100·28

Acidic elements in the soils .. .. .. 83·39 per cent.
Basic elements in the soils .. .. .. 16·89 per cent.
Total nitrogen in the soils .. .. .. ·170 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lb. Per Acre.
Phosphoric acid (P_2O_5)	·0006	15
Lime (CaO)	·0602	1,505
Potash (K_2O)	·0226	565

BEENLEIGH.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	73·08	..	..	..
Moisture	4·27	..	..	..
Combustible matter	8·05	..	8·42	..
SiO_2 (insoluble)	..	71·84	54·85	59·93
SiO_2 (soluble)	..	8·82	6·69	7·30
P_2O_5	·29	·18	·44	·49
Cl.	·004	..	·004	·004
Fe_2O_3	4·35	5·25	8·55	9·33
Al_2O_3	7·79	9·49	15·38	16·79
CaO	·84	1·10	1·74	1·89
MgO	·91	·15	1·07	1·16
K_2O	·26	·78	·87	·95
Na_2O	·20	2·16	1·86	2·03
	100·04	99·77	99·87	99·87

Acidic elements in the soils .. .. .. 67·72 per cent.

Basic elements in the soils .. .. .. 32·15 per cent.

Total nitrogen in the soils .. .. .. ·169 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

—	Per Cent.	Lb. Per Acre
Phosphoric acid (P_2O_5)	·0019	47
Lime (CaO)	·1179	2,947
Potash (K_2O)	·0280	700

MORETON.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	67·65	..	..	..
Moisture	3·92	..	..	..
Combustible matter	10·62	..	11·08	..
SiO_2 (insoluble)	..	75·51	53·44	59·91
SiO_2 (soluble)	..	8·10	5·61	6·33
P_2O_5	·12	·19	·28	·31
Cl.	·005	..	·005	·005
Fe_2O_3	4·37	5·84	8·45	9·57
Al_2O_3	11·78	7·86	17·74	20·02
CaO	·44	·52	·81	·92
MgO	·88	·10	·99	1·12
K_2O	·19	·46	·52	·58
Na_2O	·13	1·56	1·21	1·15
	100·10	100·14	100·13	99·96

Acidic elements in the soils .. .. 66·55 per cent.
Basic elements in the soils .. .. .. 33·41 per cent.
Total nitrogen in the soils .. .. .. ·197 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

—	Per Cent.	Lb. Per Acre.
Phosphoric acid (P_2O_5)	·0012	30
Lime (CaO)	·0846	2,116
Potash (K_2O)	·0099	248

GOODWOOD.

Constituent Element.	Agricultural Analysis.	Insoluble Residue. Insoluble in Hydrochloric Acid.	Absolute Analysis. Water-free Soil.	Absolute Analysis. Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	59·89	..	..	..
Moisture	2·25	..	..	..
Combustible matter	11·51	..	11·76	..
SiO_2 (insoluble)	..	57·47	35·21	39·87
SiO_2 (soluble)	..	27·91	17·06	19·31
P_2O_5	·19	·16	·29	·33
Cl.	·005	..	·005	·005
Fe_2O_3	5·55	6·44	9·65	10·92
Al_2O_3	19·69	6·75	24·23	27·45
CaO	·44	·28	·61	·69
MgO	·35	·08	·41	·47
K_2O	·13	·30	·32	·36
Na_2O	·11	·93	·69	·78
	100·11	100·32	100·23	100·18

Acidic elements in the soils .. .. 59·51 per cent.

Basic elements in the soils .. .. .. 40 67 per cent.

Total nitrogen in the soils .. .. .. ·168 per cent

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

——	Per Cent.	Lb. Per Acre.
Phosphoric acid (P_2O_5)	·0012	42
Lime (CaO)	·1185	4,147
Potash (K_2O)	·0098	343

SOUR GRASS OR YELLOW GRASS.

A grass that is causing a good deal of worry to many farmers on the Millaa Millaa and Ravenshoe country is the Sour Grass or Yellow Grass (*Paspalum conjugatum*). Several inquiries as to the best means of eradicating this grass have been sent to the Department of Agriculture and Stock, and the Government Botanist (Mr. C. T. White) has made the following report on the matter:—

"The grass is one widely spread over the tropics, and though animals will feed on it they do not take to it when other and better grasses are available. In Hawaii it is known as Hilo Grass, and the problem of its eradication there is quite a big one, principally because its spread affects reafforestation work, as it spreads over the ground as a complete mat, growing up to 2 ft. high, preventing seeds germinating and choking seedling trees out. The Forestry Department of the territory is trying sowing *Leucaena glauca* seeds over burnt areas as a cover crop, hoping it will cast a shade and kill the grass out by cutting out the sunlight. *Leucaena glauca* is a small tree widely spread over the Pacific Islands and not uncommon in North Queensland. As this method means that the land has got to be locked away from stock for some time, however, it is one quite unsuited for agricultural areas.

"Experiments should be made with a view to its eradication. The only method I can think of is to try and smother the grass with another rank-growing species that is at the same time a good dairy grass, and for this purpose I would suggest Kikuyu Grass, *Panicum muticum*, and, perhaps, Elephant Grass.

"Kikuyu Grass has been found of great value in the eradication of bracken from pastures in New South Wales, and there is a possibility of it proving of value in combating Sour Grass on the Atherton Tableland.

"Where possible the ground should be ploughed and worked, and later drills opened about 3 ft. apart and Kikuyu Grass roots dropped in about every 3 ft. Where the ground is too rough for this the roots should be hoed in about 3 ft. apart each way. The same remarks apply to *Panicum muticum*—this work might be done any-time from September to March, but preferably I should say during the first summer rains.

"Elephant Grass might be tried along with Kikuyu, planting the latter between the rows of Elephant Grass. While these grasses are getting a good hold stock should be kept from them, and for this purpose it will probably be found necessary to subdivide properties more than at present is usually done.

"In addition to the above method smothering the grass with a growth of the Florida Velvet Bean (*Stizolobium deeringianum*), or other rampant recognised leguminous fodder, might also be tried."

QUEENSLAND TREES.

BY C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

No. 22.

The Bolly Gum (*Litsea reticulata*) is one of the largest of scrub trees. Its timber has been used for many years for staves, lining, and cabinet work. The barrel is often flanged at the base in the heavier scrubs of the North Coast line, but in the scrubs of the Macpherson Range the flanges are often suppressed. In appearance the timber is somewhat like Queensland maple, but is lighter in colour and plainer in figure. The trees attain a height of 150 feet and a barrel diameter of 5 feet. The bark is brown and fairly scaly, showing roundish depressions from which small rounded flakes of bark have been shed. The trees abound in the coastal scrubs of New South Wales and Southern Queensland, and extend from the Hawkesbury River, New South Wales, to Cairns, North Queensland.

Photo. by the Authors.]

PLATE 2.—THE BOLLY GUM (*Litsea reticulata*).

A specimen in the rain forest of Roberts Plateau, National Park.

Photo. by Dept. of Agriculture and Stock.]

PLATE 3.—THE BOLLY GUM (*Litsea reticulata*).

(A) Flowering Twig. (B) Fruiting Twig.

WEEDS OF QUEENSLAND.

BY C. T. WHITE, Government Botanist of Queensland.

No. 33.

TREE GROUNDSEL (*BACCHARIS HALIMIFOLIA*).

Description.—A tall shrub, diœcious (*i.e.*, the sexes on different plants), glabrous or the young shoots somewhat viscid—scurfy. Leaves 1-2 inches long, obovate, prominently toothed with a few large teeth in the upper portion, the lower portion gradually narrowing into a petiole or leaf-stalk. Flower heads on the male plant, sub-globose, small, solitary or a few clustered together. Flower heads on the female plant solitary in the axils of the upper leaves and clustered at the ends of the branches, forming large terminal loosely-branched panicles. Achenes (seeds) ribbed, straw-coloured, scarcely one line long, capped with a white pappus about ½ inch long.

Distribution.—A native of Tropical North America; a naturalised weed in Queensland. Has increased a good deal of late years and capable of becoming a considerable pest if not checked.

Botanical Name.—*Baccharis,* a name given by the Greeks to some aromatic plant dedicated to Bacchus; *halimifolia,* Latin relating to the plant having leaves like a *Halimus,* plants now placed under the genus *Atriplex.*

Supposed Poisonous Properties.—*Baccharis* is a large genus of plants principally South American, and one species there *B. cordifolia,* the Romerillo or Mio Mio of the Argentine, is well known as a stock poison. An exhaustive account of this plant and its effect on stock will be found in the following paper by Dr. R. Bidart, "Toxicidad del Romerillo, Contribucion a su Estudio" contained in "Memoria de la Direccion General de Ganaderia 1910, 11, pp. 122-127, Buenos Ayres."*

As *B. halmifolia has* quite commonly been suspected of poisoning stock in Southern Queensland, particularly about Caboolture, Bald Hills, and other localities on the North Coast Line, feeding experiments were made with the plant at the Stock Experiment Station, Yeerongpilly, and a report published in the Annual Report of the Chief Inspector of Stock, 1919-1920 (Annual Report Department of Agriculture and Stock, Brisbane, p. 677). Two heifers were fed continuously for a period of a fortnight, on a ration of mixed leaves and chaff in almost equal proportions. Three guinea-pigs were fed for almost twelve days on the leaves and ate them with avidity. One died and post mortem examination proved that the internal viscera were normal and full of partially-digested food. This animal was greatly emaciated, and although apparently the food was bulky, it lacked the necessary nutrient material to support life, and death had resulted from malnutrition. The two remaining animals looked healthy, but greatly emaciated and anaemic. These were started again on their normal ration and did well. Constipation was a marked feature in the stock fed on Baccharis. From this it would appear that the plant is not definitely poisonous to stock, but is quite valueless as a fodder.

Eradication.—The plant forms a large bush or shrub, and hoeing the young plants and grubbing out the larger clumps is likely to be the only satisfactory way of dealing with it. It is a robust grower and I rather doubt the efficiency of poisonous sprays.

Botanical Reference.—*Baccharis halimifolia* Linnaeus Species Plantarum 860.

* I am indebted to Mr. H. Tryon for this reference.

PLATE 4.—TREE GROUNDSEL (*Baccharis halimifolia*).

SCIENCE AND THE FARMER.

A SURVEY OF QUEENSLAND AGRICULTURE.

RURAL PROBLEMS—SUGGESTED EDUCATIONAL SCHEME—THE IMMIGRATION QUESTION—THE QUEENSLAND UNIVERSITY AND THE STATE'S GREAT BASIC INDUSTRY.

In the course of a recent public lecture, under the ægis of the Queensland University, Professor Goddard expressed some views of intense interest to all connected with the future of agriculture in this State, and the main points of his address, relating more particularly to the problems facing the farming industry, are set out hereunder.—Ed.

Professor E. J. Goddard, B.A., D.Sc., in the course of a recent public lecture in Brisbane on "Biological Activities in Relation to the State, surveyed many of Queensland's rural problems and made some noteworthy remarks on this State's agricultural future. The Senate and Staff of the Queensland University were fully represented and the chair was occupied by the Premier (Hon. E. G. Theodore).

After dealing with more abstruse scientific matters, Professor Goddard declared that one day this State would have to tackle the question of attracting people to its land from other lands for national and economic reasons, but the time was not opportune until some more constructive scheme than that of overcrowding the cities was available. Undoubtedly the greatest economic question confronting the Commonwealth was that concerned with agriculture.

Agriculture as a National Concern.

In Australia, and particularly in Queensland, agriculture, as a national problem, appeared to him to call for consideration of the following:—

(1) Agricultural settlement;
(2) Agricultural survey, with a view to maximum production;
(3) Control of distribution of agricultural products;
(4) Agricultural education;
(5) Agricultural research;
(6) General scientific research;
(7) Meteorological research;
(8) Hydrographical and topographical survey with a view to immigration.

All these problems were intricately bound together, necessitating the exercise of much constructive and educated thought. When one viewed the small population of Australia, and the enormous proportion which was concentrated in the cities, there was occasioned much wonderment. He thought that the real reason for the marked disproportion of the people in our cities to those on the land lay in the fact that thousands of young Australians in the cities were desirous of going on the land, but owing to force of circumstances were unable to secure a sound agricultural education, or who, if such were available, could not secure the necessary land. Again, there had never been any serious attempt to attract people from the city to the land.

The Education of the Future Farmer.

The following Press report of the lecture covers the general scheme advanced by Professor Goddard for the education of the future agriculturist. After dealing fully with the migration, to the great problem of agriculture, he said:—"On the economic side, biology is most intimately linked up with agriculture. Undoubtedly, the greatest economic question confronting the Commonwealth of Australia is that concerned with agriculture. This is equally the case in all countries in the Southern Hemisphere, and I have enjoyed the opportunities offered by a life spent in two of these countries of studying this problem from the academic and, I hope, practical standpoint. There is no problem of deeper concern for statesmen, universities, and all true patriots. In Australia the agricultural question touches the very vitals of the country in many insidious ways, and the correct handling of the problem demands, above all things, clear-headedness, perspective, courage, and honesty of thought, and the overthrowing of many old ideas conserved by self interest in antagonism.

The Scientist and the Economics and National Life of the State.

"Many agricultural schemes have been tried in various parts of the world, but few, if any, have ever given full satisfaction, simply because they stop just where they might impinge on the field of vested interests, a policy which in these days there is a gradually increasing national desire to break down. As a biologist, my interests in agriculture will be patent on the grounds that many aspects of biological science look towards agriculture, but any interest which I may form in that respect will be strengthened by the fact that I have the privilege of occupying a university chair in a country demanding agricultural development, and, more important still, the settlement of a large white population on the land. Consequently, in treating the subject of agriculture, I propose to view the subject from the academic standpoint, that is to say, as a biologist who recognises that he must orientate himself towards the question by viewing it from, and not dispensing with, the purely biological aspect.

"It may be that some may think that the field I propose to traverse lies beyond the province of my concerns, and exceeds the limits of my theme, but may I point out that this idea of water-tight compartments of knowledge and thought has been the devastating agent responsible for destroying the vitals of much work of the greatest national value. It is here that theory and practice have been severed and forced apart, and to a very large extent the functions of our universities have been prostituted. At the present day it is the bounden duty of the university professor, and particularly one engaged in work which is directly or indirectly linked with matters concerning the economic and national life of the State, to take the comprehensive and practical point of view.

Agricultural Education.

"The more one views the question the more patent does it become that agricultural education must begin at the bottom and not at the top. Any sound scheme of such education must have in view, not the mere training of experts so badly and urgently required, but also as its major purpose the idea of attracting and training young agriculturists, so as to get the maximum efficiency from the maximum number. I fully recognise that the Agricultural College, as we know it in Australia, has done much good work of an experimental and educational nature, but I cannot concede that it has been successful in increasing the popoulation on the land nor has it increased production to the extent that modern national needs demand, in the absence of a complete scheme of education. The same criticism may be levelled more vigorously against the replacement of a national scheme of agricultural education by a University Faculty of Agriculture. There is room for both these types of institutions in a general scheme.

An Agricultural Survey.

"It seems to me that it is essential that Queensland should institute at once an agricultural survey. Such survey would have as its object an investigation of the various districts under the control of the District Councils and their subsidiary Local Producers' Association, for the purpose of deciding, even in a preliminary manner, the best types of agriculture to be encouraged in each district. This investigation would include research into the chemical character of the soils, rainfall, and general climatic conditions, and the determination of a list of products arranged in order of importance and keeping in view the scheme of rotation. In each district should be instituted Rural Schools—a scheme which I note is being extended by the Queensland Government—where, after education in a State School, continuation classes could be continued giving instruction in certain liberal lines as well as in agricultural topics and economics, and also in domestic science.

Land for Agricultural Students.

"Such schools will serve not merely to enlighten children whose birth dooms them to the land, but will help to attract many from the towns, and will hasten the raising of the status of the ordinary farmer to that dignity of which until comparatively recent times he has been dispossessed. Such pupils should have the opportunity of serving an apprenticeship, and of concentrating on a knowledge of those particular products for which the area is specially suited. It is here that a land settlement scheme should be evolved. Land should be made available on the easiest terms for such students, who should thus be encouraged to become independent farmers, if not immediately after graduation, at least at some definite period succeeding graduation. In the interim they might well complete their period of apprenticeship as farm labourers within that district, the labour supply of which could thus be controlled by the District Council in its contact with the Rural Schools of their districts.

"For purposes of more advanced agricultural education there should be instituted agricultural schools, where teachers for the Rural Schools could be trained, and where

those who are ambitious to proceed further than the curriculum of the Rural Schools might be attracted from the Rural Schools or from the schools of higher status in the towns. The number of colleges should be based on the ability to cope with practical teaching in all the outstanding products of the districts falling within the scope of such colleges.

"There should be a system of scholarships, and again there should be a land settlement scheme which will enable any student who completes the course to acquire land on a reasonable basis. There can be little doubt that such institutions will in a very effective way serve as a lure to attract many of our city youth to the farming profession. Proficiency in the practice of farming and consequent eligibility for land grants might be made dependent on some term of employment in the district in which the education has been completed.

"Such institutions, in conjunction with the Rural Schools, will assure that co-operative spirit and mutual interest in the district which is essential to the welfare of agricultural effort. This co-operative spirit is to-day manifesting itself in South Africa, where, I think, the agriculturist has been victimised and isolated by the speculator and non-agriculturist to a probably greater extent than in any part of the world. Agricultural commerce should be controlled by agriculturists, and for the purpose of producing greater efficiency in this respect there should be available courses of instruction in commerce.

Agriculture and the University.

"Agricultural education could be carried a stage further at the university, where courses in special agricultural subjects could be followed in conjunction with those pure science subjects with which they are cognate or with which it is desirable that any prospective agricultural research student should be familiar. In this way there could be equipped an army of investigators who should have an excellent agricultural equipment and could serve the agricultural colleges as well as fill posts as Government experts. There should be available for such students overseas scholarships which would enable them to spend at least one, but preferably two, years abroad.

"In this way the university could discharge its national duty in respect to agriculture and do an enormous amount towards relieving the present sad state of affairs in respect of the paucity of Australian-trained agricultural specialists. In this way there would be a linking of a series of educational institutions seriously and intimately bound up with the agriculturists of the State, and working in co-operative and scientific spirit for the welfare and progress of the agricultural industry. It is in this way that the university can exercise its influence as a national centre for the training of men destined to guide the future of the agricultural industry, and can help to break down the present tendency to regard the university man as one concerned merely with the theoretical in life."

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RETURNS FOR JUNE, 1923.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Prim	Friesian ...	4 April, 1923	1,140	3·3	43·80	
Miss Security ...	Ayrshire ..	8 June, ,,	667	5·3	41·40	
College Cold Iron	Jersey ..	23 April, ,,	570	5·4	35·30	
Snowflake	Shorthorn	17 April, ,,	600	3·7	25·80	
College Prima Donna	Friesian ...	19 Mar., ,,	630	3·3	25·50	
Charming Damsel	Ayrshire ...	27 April, ,,	540	4·0	25·20	
Rainfall of Marinya	,, ...	29 Mar., ,,	570	3·7	24·60	
Lady Loch II. ...	,, ...	20 April, ,,	540	3·7	23·40	
College Evening Glow	Jersey ...	5 April, ,,	450	4·4	23·10	
Lute	Ayrshire ...	26 April, ,,	480	4.0	22·20	
College Mignon ..	Jersey ...	22 Nov., 1922	360	5·0	21·00	
Little Buttercup ...	Friesian ...	3 Mar., 1923	540	3·3	20·70	
College Nita ..	,, ...	5 April ,,	510	3·5	20·70	
Lady Mitchell ...	,, ...	1 May, ,,	510	3·5	20·70	
Yarraview Village Belle	Guernsey ...	19 Feb., ,,	330	5·3	20·40	
College Ma Petite	Jersey ...	12 June, ,,	361	4·8	20·33	

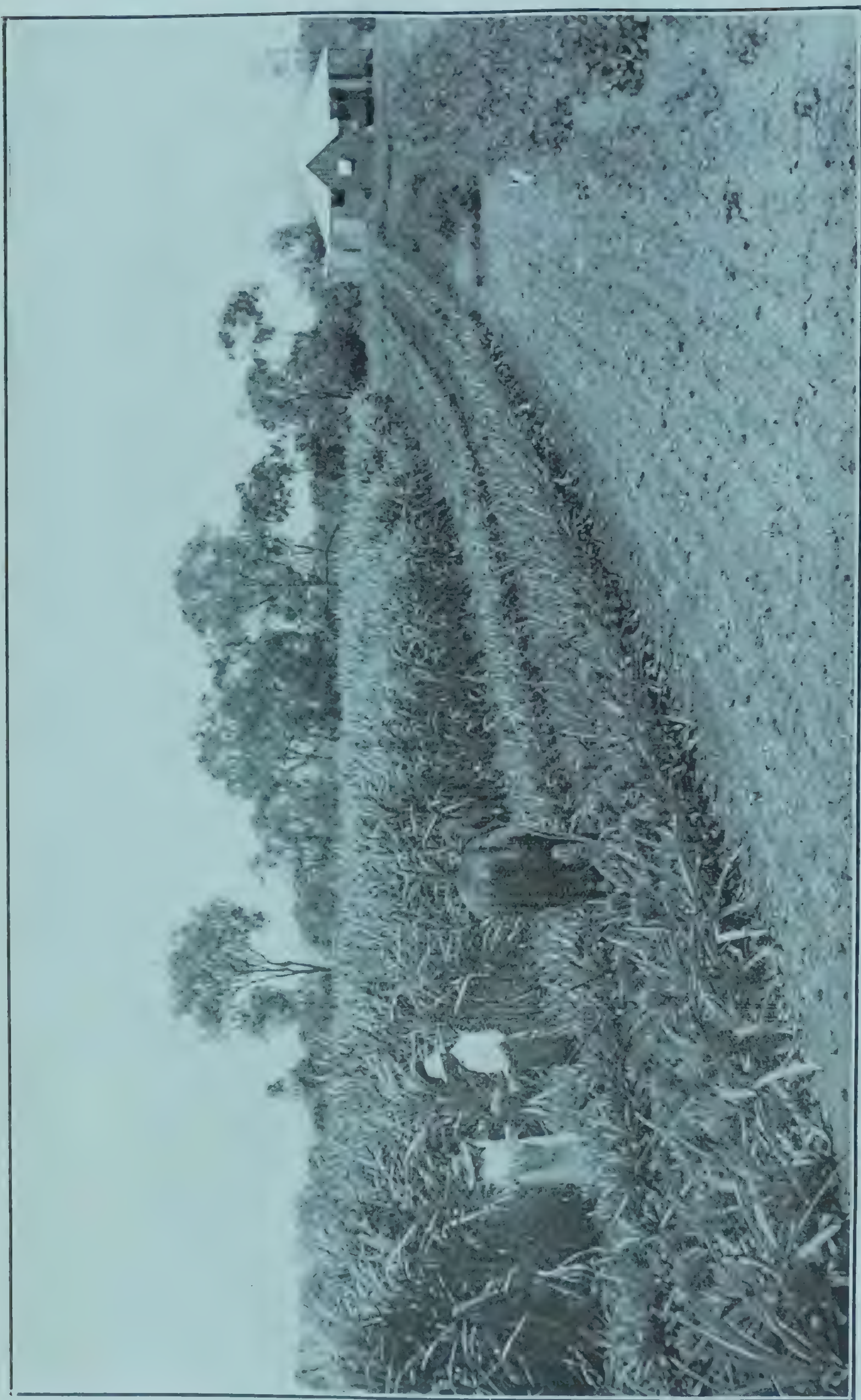


PLATE 5.—SUGAR CANE AND PINEAPPLES ON "BROOKLANDS," MR. J. DENNETT'S PROPERTY AT CHOWEY, BURNETT DISTRICT.

PLATE 6.—COFFEE FROM TREE TO TIN IN ALL STAGES.
MR. BOARD'S EXHIBIT AT THE BUDERIM SHOW.

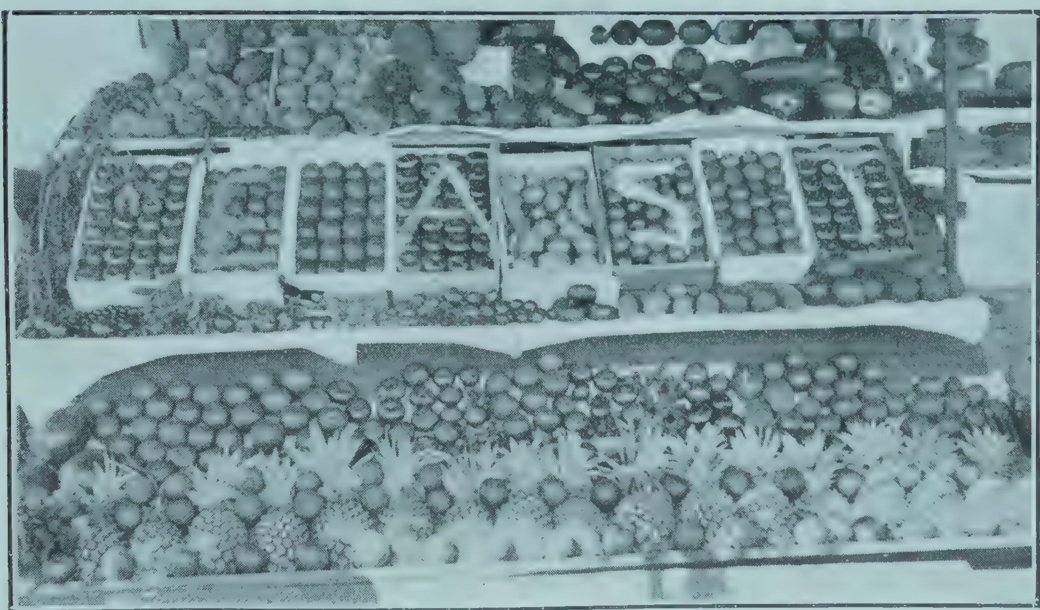


PLATE 7.—QUEENSLAND FRUIT, AN EAST BUDERIM DISPLAY.

General Notes.

The British Empire Exhibition.

The last day for receiving applications for space in the agricultural section of the Queensland display in the forthcoming Empire Exhibition at London is 31st July. The Department would be glad to be informed of any non-perishable produce which, in the opinion of growers, has sufficient exhibition merit. The products covered by the agricultural schedule include those from orchard and garden (non-refrigerated), vineyard and field (cereals and products, fodders and plants, cotton and other fibres, sugar).

Prickly-pear as Fodder—New Machines Tested.

Two new machines for treating prickly-pear as a stock food have been brought under the notice of Departmental officers recently. Mr. A. E. Gibson (Instructor in Agriculture) inspected one of the machines in operation, the patent of Mr. Page, of Warra, and observed that it was capable of treating 3 or 4 tons of pear daily, shredding it and improving its palatability for stock. The construction of the machine is very simple. A second machine, manufactured at Ipswich for W. Sinclair, of Westbrook, was observed to be different, its action being more slicing than shredding in character. Both machines proved effective for the purpose for which they were designed.

Tick Investigation.

The Director of the Institute of Science and Industry (Sir George Knibbs), accompanied by Mr. R. Short, of the Stock Department, recently visited the Stock Diseases Experimental Station at Yeerongpilly, and were received by the Government Bacteriologist (Mr. C. J. Pound). After explaining and demonstrating the course of the investigations, Mr. Pound indicated the results which had now been obtained and showed the Director the material under review. The result of this work will be the subject of a bulletin now being prepared by the committee specially appointed to deal with cattle-tick control. This bulletin will be published by the Institute of Science and Industry. The Director, deeply interested in what he saw, in answer to a question as to the significance of the results, stated that he regarded them as of very great economic value. It had been demonstrated in America that experimental work on the cattle-tick pest was exceedingly valuable, and by appropriate action would be made really effective. "Indeed," said the Director, "if the views of the special committee be given effect, there is very little doubt that the tick pest will be as effectively dealt with here as it has been in the United States of America."

Motor Fuel from Molasses.

A plant is to be established in Cuba capable of producing 900,000 gallons of motor fuel alcohol annually.

The decision to convert the molasses production of the plant into alcohol for internal combustion engines, says "Facts About Sugar," is in line with expectations in the sugar trade that other than the previously existing means will gradually be found for the disposal of blackstrap, the price of which last year went as low as 2 cents a gallon, delivered in New York, at which level the producer lost money by selling.

As far as can be learned the product of the still will be virtually ready for consumption in engines as it leaves the apparatus. The fermentation of the molasses will produce a mash varying in alcoholic content from 5 to 10 per cent., and this will be fed continuously to the still. Provision, it is understood, has been made for carrying off the water and eliminating the fusel oil, while part of the alcoholic vapours will be treated with heated sulphuric acid, so as to produce ether. The ether gases and the remainder of the alcohol gases will be condensed together so as to give as the product of the still a mixture of ether and alcohol suitable for consumption in internal combustion engines.

With the exception of some aniline colouring matter used to prevent the alcohol from being sold for human consumption, and the addition of a small quantity of chemical to prevent rusting in the engines, the fuel will be complete as it leaves the still.

The plant is expected to consume in the neighbourhood of 5,000,000 gallons of molasses annually.—"South African Sugar Journal."

Departmental Appointments.

Cane Testers—Season 1923.

A. L. Levy	L. H. Fuller	R. B. May
D. Marles	I. McGill	J. S. Pollard
F. W. Trulson	J. Howard	J. C. D. Casey
C. Rowe	H. Lambert	H. Jorgensen
K. Dunton	A. A. McCullagh	F. Jorss
K. Fauth	L. C. Home	S. C. Bracey
H. G. W. Barton	I. V. Palmer	R. J. Rollston

at Bingera, Fairymead, Farleigh, Kalamia, Maryborough, Millaquin, Moreton, Mourilyan, North Eton, Pioneer, Plane Creek, Pleystowe, Qunaba Racecourse, Gin Gin, Inkerman, Proserpine, Doolbi, Cattle Creek, Mount Bauple, and Marian mills respectively as from the 1st July, 1923, until the 31st December, 1923.

Assistant Cane Testers.

E. Christsen	P. H. Compton	L. Chadwick
J. E. O'Reilly	T. D. Cullen	J. McFie
A. G. Kelly	P. J. Phelan	

at Millaquin, Farleigh, Plane Creek, Babinda, Pleystowe, Inkerman, Marian, and Proserpine mills respectively, as from the 25th July, 12th July, 25th July, 29th June, 26th July, 13th July, and 17th August, 1923, respectively.

C. J. Boast and M. T. Smith have been appointed as Cane Testers as from the 22nd May and the 22nd June, 1923, respectively, at South Johnstone and Babinda mills respectively.

The Officer in Charge of Police, at Collinsville, has been appointed an Acting Inspector of Stock under "*The Diseases in Stock Act of* 1915."

Police Constable J. Lane, of Tolga, has been appointed an Inspector under the Slaughtering Act.

N.U.P.B.A. Activities—A Lecture on Wyandottes—Points of a Favoured Breed.

Dr. A. J. McDonald delivered an informative address on the Wyandotte at the last monthly assembly of members of the National Utility Poultry Breeders' Association. Mr. M. H. Campbell, senr., vice-president, was in the chair. The lecturer, who has bred Wyandottes for a considerable number of years, being a persistent winner in the show pen, recently crowned his long list of successes by capturing first and champion with a White Wyandotte in Sydney Royal Show. The cockerel was on exhibition during the evening for demonstrative purposes. In his opening remarks the lecturer stated that it was not his desire to give a formal lecture, but to furnish material for a discussion or debate. The Wyandotte, he said, in general conformation was a bird of curves, being neither so low set or short backed as an Orpington, nor so high on the legs or long-backed as the Plymouth Rock or Rhode Island Red. The ideal Wyandotte type was the happy medium between the two, being broad, deep, nuggety, and thick set. The depth from the back to the keel should be about equal to the length from the front of the breast to the pelvic bones. The rose comb should be very neatly set on the head like a little cap and should be free from coarseness. The head should be broad, short, and well rounded, the eye (this is most important) being a red bay colour neither grey nor green. Neck short and thick, and back sloping gradually up to the tail, which should also be short and broad. The body should be well set up on the legs so that the shank can be plainly seen. The bird should be well balanced. The lecturer was very anxious that his audience should fully grasp what he meant by type, and passed around numerous photographs to illustrate his meanings. Mr. Frank Stansfield exhibited a Barred Rock cockerel for comparison in type, and Mr. Kidd of the Social Sub-committee of the Association, took the opportunity of obtaining a promise from Mr. Stanfield to lecture on Plymouth Rocks in the near future. As the N.U.P.B.A. is primarily a utility club, the utility qualities of the Wyandotte were productive of considerable discussion. It appears that the White Wyandotte has never been thoroughly exploited in Australia for utility purposes. They have, it was claimed, proved wonderful winter layers, but were not nearly so good in the hot weather, as they have not yet become thoroughly acclimatised. Figures were quoted from competition results by Messrs. Kidd and A. E. Walters, which bore out the foregoing facts; although in America they have reached a very high state of perfection from a utility standpoint, having reached over the 300-egg mark. The results of the recent egg-pool ballot have proved conclusively what a high position the N.U.P.B.A. holds, and what a large influencing factor the Association is in the minds of the utility section of Queensland poultry men. No fewer than four of the five successful candidates for the Egg Pool Board are N.U.P.B.A. members, and the Association has implicit confidence in the ultimate success of the Pool. As a result of energetic efforts the price of mill offals has recently been reduced by 30s. per ton.

Extension of Cotton Proclamation.

Proclamations have been issued under the Sugar Acquisition Act further extending, until the 31st July, 1923, the existing Proclamations by which all cotton grown in Queensland is acquired by the Government under that Act.

Canada Interested in Queensland Agricultural Organisation.

The Minister for Agriculture (Hon. W. N. Gillies) has received a letter from the Commissioner of the Department of Agriculture, Ottawa, Canada, asking especially for a copy of the Bulletin "Scheme for the Organisation of the Agricultural Industry of Queensland." The Commissioner mentioned that he had seen this pamphlet in Ottawa, and it had so stimulated his interest that he was thus writing for a copy for his own use. The incident is noteworthy, as it indicates the interest that is being taken in other parts of the world in the agricultural policy of the Queensland Government.

The Cactus Curse—A Quest for Natural Enemies.

The Commonwealth Prickly-pear Board, which consists of Sir George Knibbs (chairman), representing the Institute of Science and Industry; Mr. G. Valder, representing New South Wales; and Mr. A. G. Melville, representing Queensland, held meetings in Brisbane recently. They inspected the laboratories of the board at Sherwood to see the present state of development of the experiments, and to inspect the growth of the various insects now acclimatised and being bred to attack the pear. During the meeting the board had under review the whole of the past work, and all suggestions made for attacking pear, and material for that purpose. Special attention was given to the means of insuring against the liberation of any of these which might themselves prove a danger to plants of economic importance, and generally. It is pointed out that up to the present time no sanction has been given by the board to the liberation of any material under its control or handled in its laboratories. The conditions under which the liberation of the enemies of the pear is likely to be effective were also considered. Mr. W. B. Alexander, who is in charge of the whole of the work during the absence of Mr. J. C. Hamlin in the United States, accompanied the board on its inspection.

Sheep as Weed Exterminators.

Mr. Hugh McMartin advises that his sheep are proving very efficient weeders in his cotton patch at Indooropilly. They have gone through the whole of the field and have left the rows perfectly clean, thus obviating the necessity of chipping. The cotton shrub as a fodder evidently has no appeal for sheep, and though the weeds, especially pig-weed, were cleaned up thoroughly the cotton plants were left severely alone.

Answer to Correspondent.

Peanut Cultivation.

T.S. (Purga)—

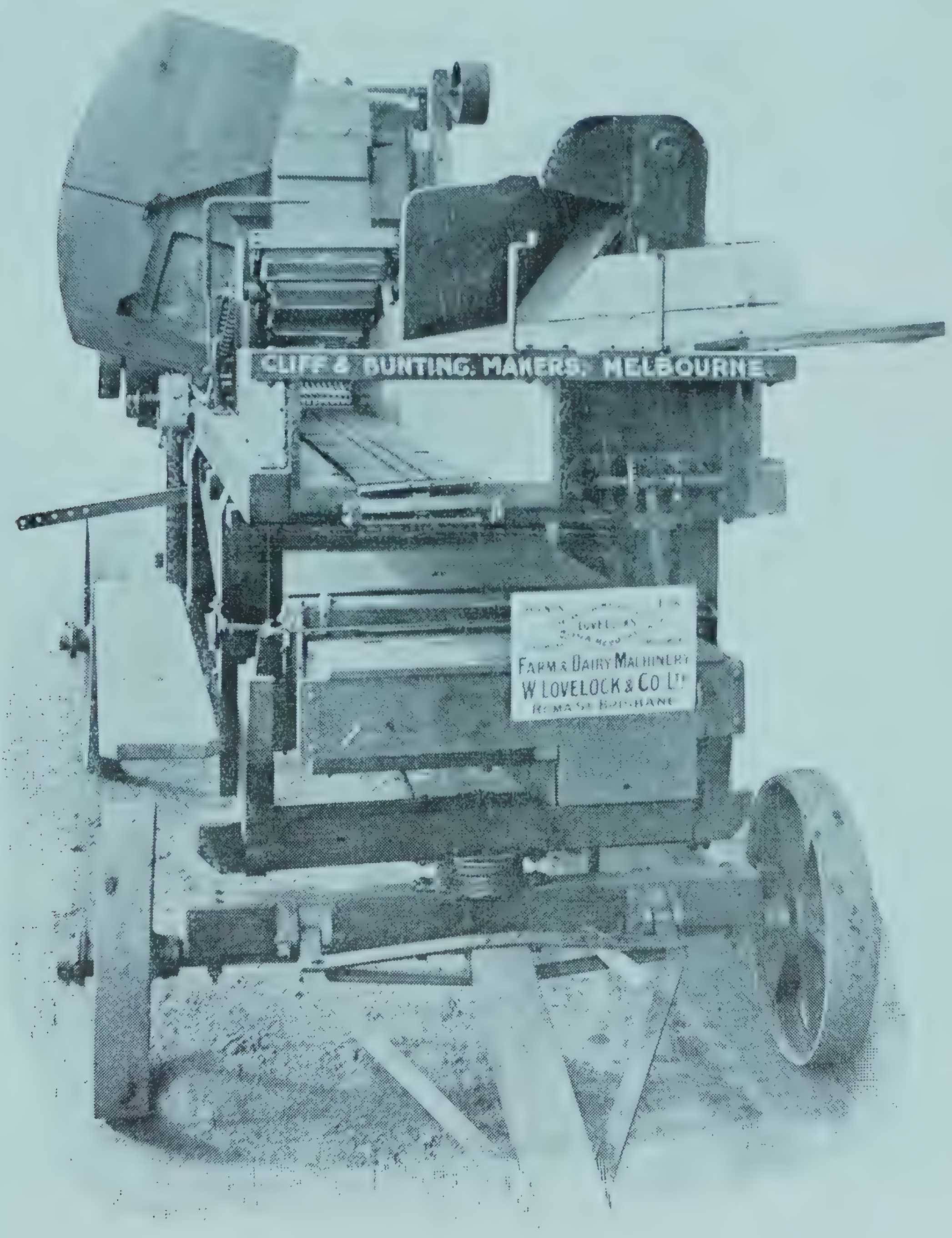
The time for peanut planting varies according to climate. In the cooler districts, sowings may be made when all danger of frosts is over and the soil may be expected to be reasonably warm, September, October, November, and December being suitable months. In the tropics the crop can be grown practically throughout the year, but consideration must be given to climate and rainfall—*i.e.*, sufficient rainfall to give the crop a start, and reasonable expectation of fine weather for harvesting; other information on peanuts is contained in a "Journal" extract sent direct.

A NANANGO BIRD SANCTUARY.

The Broadwater Camping and Water Reserve, in the neighbourhood of Nanango, has been made a sanctuary under "*The Animals and Birds Act of* 1921," and Messrs. J. A. Lee, C. S. Stewart, J. T. Mulcahy, and A. Smith have been appointed officers under the Act.

GIANT CHAFF CUTTER.

A Giant Chaff Cutter made in Australia, with Australian materials and by highly-skilled Australian workmen, for service on the Downs, from the floor of W. Lovelock and Co., Ltd., Roma street. Back view, showing web feed.



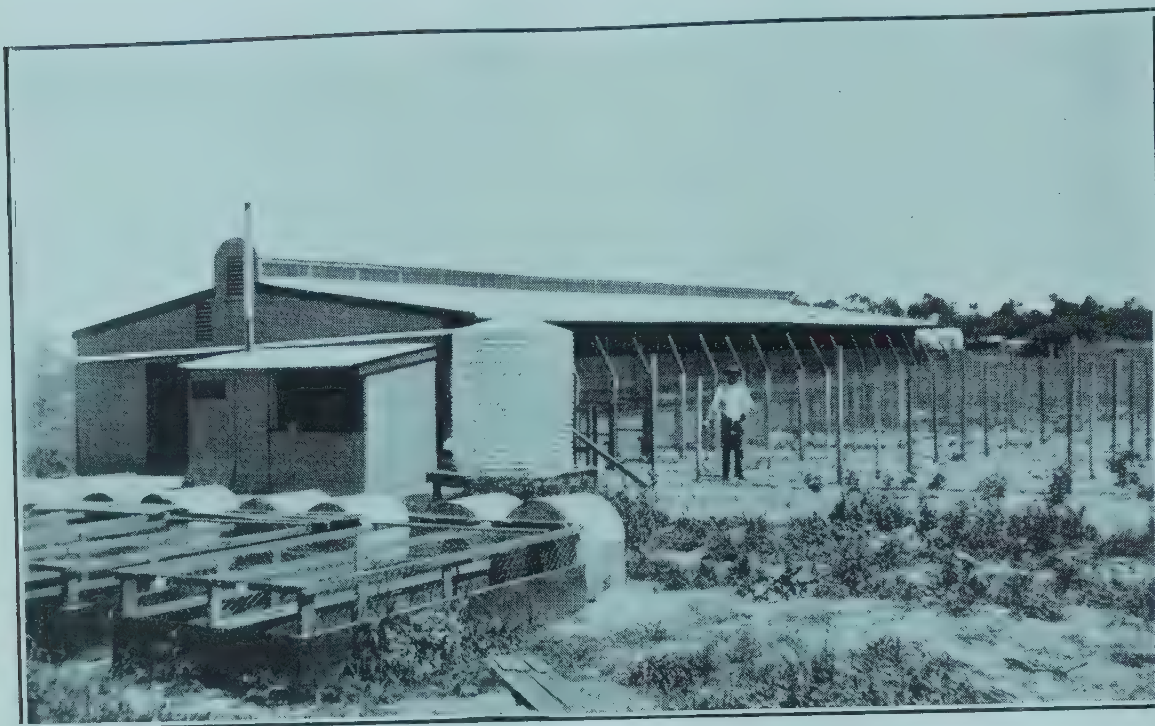


PLATE 8.—"ALL VARIETIES" (VICTORIA), MAMMOTH BROODER SHED CAPACITY, 3,500.

PLATE 9.—A PEN OF COCKERELS, "ALL VARIETIES" STUD (VICTORIA).

PLATE 10.—CITRUS EXHIBIT, BUDERIM SHOW.

PLATE 11.—A NEW FRIESIAN RECORD BREAKER.

"Dairymaid," the property of P. P. Falt, Tingoora. In nine months she produced 15,792 lb. of milk and 696·58 lb. b. f. = 819½ lb. c. b.

PLATE 12.—"CHAMPION KING."

Bred by J. C. Mickelburough, "All Varieties" Stud Poultry Farm, Victoria, and adopted by South Australia for their Standard.

ON A SOUTHERN POULTRY FARM.

A QUEENSLAND BREEDER'S IMPRESSIONS.

Lecturing recently before the Brisbane branch of the National Utility Poultry Breeders' Association, Mr. Stanley Lloyd, a member of the council of that body, had something to say on the methods employed successfully on a Victorian stud poultry farm. A recent Southern tour by Mr. Lloyd embraced a visit to Mr. J. C. Mickelburough's "All Varieties" farm, at Cheltenham, near Melbourne, and the following points have been taken from a very interesting and informative paper:—

A Novel Cool Brooder.—On the Victorian farm, which is regarded as one of the show poultry places in the Southern State, was seen a novel cool brooder, the owner's own idea, in the form of a frame 3 in. by 3 in. and 18 in. high, with a bag so arranged on top that it can be adjusted according to the age of the chickens. On this is placed a large feather pillow; then strips of flannel are dropped in front of the brooder, which completes a brooder capable of holding 100 chicks. Rarely does a loss occur when once the chickens are placed in these. Cold brooders for chickens under three weeks are not advisable, as they mean too much labour.

A Modern Egg Room.—The layout includes a brick egg room neatly fitted with divisions and trays to hold eggs from forty-seven breeding pens, neatly labelled with full particulars of breeding and number of pens. The system is good, as each egg is also numbered; this gives a double check. No client need ever worry about the eggs received, as every tray carries the date when last emptied. Should any pen not be sold within five days, the eggs are removed from same and placed in the incubator. A very interesting display was made of four trays of eggs carefully graded, two of browns, each a different shade, packed between white and purple paper, and two of white of different shades packed between blue and brown paper. This is really the American style, and one can hardly realise the effect without seeing it. The walls of the egg room are covered with awards; in fact, one might say the ceiling also. This shows that "All Varieties" stock is not only bred to lay, which has been proved by the egg-laying competitions, but are carefully bred on standard lines.

A New Idea.—A small show of fifty of the nest stud birds, all in single pens, with a card over same, showing breeding and record of eggs laid and any other awards was, to the lecturer, a new idea, enabling anyone to study the type of bird that had made a name for itself.

A Great Bird.—Among the pick of the pens was "Champion King," a cockerel of thirteen months, and with a great future before him. He is bred from 326 over 307, and shows that the full scale of points can be obtained, and at the same time carry the best line of blood for heavy egg production, and is without doubt one of the best type Orpingtons that has ever been shown in utility classes, carrying a very neat head, large bold dark eye, with a neat comb, showing good texture and no coarseness, with great length, depth, and width of body and excellent plumage, soft silky, with a beautiful green sheen.

Other Feathered Aristocrats.—While among the Black Orpingtons, "Lady Queeny," winner of last Burnley test, and "Queen Bess," first individual trap-nest, Burnley, 1921, were fresh blood, showing great type and size, with neat heads, good in texture and eyes. "Lady Victory," who had just made such a name for herself at the Royal Show, by winning first and blue ribbon in a class of thirty-five pullets, showed wonderful stamina, and is a bird that will weigh well over the 5 lb., with a great length, depth, and width of body, nice, finely modelled head, bright, clean face, and a large, bright, expressive eye. "Lady Perfection" is one of the best White Leghorn pullets for type and quality that has ever been owned by any utility poultry breeder. She made her first appearance at the last Royal Show, where she won first in a very big class. The judges can be complimented upon selecting such a bird, with a breeding, as she has 335 over 307, which proves that "All Varieties" is not satisfied with eggs alone. "All Varieties Queen" is a White Leghorn hen that anyone would be proud to own, not because she has won first and blue ribbon at the last Royal Show, but for her type and quality, which is just what our Leghorn breeders want. Her line of blood stands alone as a laying strain.

Modern Methods.—Breeding pens are carefully arranged to save labour in feeding and cleaning. The use of single test pens ensures the attainment of a high standard of stock. Birds are carefully culled for size and type. Only the very best standard birds are selected, and from these, after twelve months' testing, the heaviest layers are picked for single mating, from whence "All Varieties" high-class males have sprung. Runs are continually sown with oats, which not only keeps them fresh but provides feed and work for the birds. Mammoth brooder sheds have a 3,500 capacity, and are water heated. Temperature has a range of 20 degrees. The Russell watering system is installed, ensuring a regular supply of cool and clean water.

Generally, the farm provides a striking object lesson in modern poultry farming, its system and methods are quite suitable for conditions in this State, and a visit should be included in any touring Queenslander's itinerary.

Farm and Garden Notes for August.

Land which has been lying fallow in readiness for early spring sowing should now be receiving its final cultivation prior to seeding operations. Potato-planting will be in full swing this month, and in connection with this crop the prevention of fungoid diseases calls for special attention. Seed potatoes, if possible, should be selected from localities which are free from disease; they should be well sprouted, and, if possible, should not exceed 2 oz. in weight. Seed potatoes of this size are more economical to use than those large enough to necessitate cutting. If, however, none but large-sized seed are procurable, the tubers should be cut so that at least two well-developed eyes are left. The cut surfaces require to be well dusted with slacked lime, or wood ashes, as soon as possible after cutting. Where it is necessary to take action to prevent possible infection by fungoid disease, the dipping of potatoes in a solution of 1 pint of 40 per cent. formalin to 15 gallons of water, and immersing for one hour, will be found effective. Bags intended for the subsequent conveyance of tubers to the paddock should also be treated and thoroughly dried. After dipping, spread out the potatoes and thoroughly dry them before re-bagging. Where the tubers are cut, the dipping is, of course, carried out prior to cutting.

Arrowroot, yams, ginger, and sugar-cane may be planted this month in localities where all danger from frosts is over.

Maize may be sown as a catch crop, providing, of course, that sufficient soil moisture is available.

Sweet-potato cuttings may also be planted out towards the end of the month.

Weeds will now begin to assert themselves with the advent of warmer weather; consequently cultivators and harrows should be kept going to keep down weed growths in growing crops and on land lying fallow, as well as on that in course of preparation for such crops as sorghums, millets, or panicums, maize, and summer-growing crops generally.

Tobacco seed may be sown on previously burnt and well prepared seed-beds.

Kitchen Garden.—Nearly all spring and summer crops can now be planted. Here is a list of seeds and roots to be sown which will keep the market gardeners busy for some time: Carrots, parsnips, turnip, beet, lettuce, endive, salsify, radish, rhubarb, asparagus, Jerusalem artichoke, French beans, runner beans of all kinds, peas, parsley, tomato, egg-plant, sea-kale, cucumber, melon, pumpkin, globe artichokes. Set out any cabbage plants and kohl-rabi that are ready. Towards the end of the month plant out tomatoes, melons, cucumbers, &c., which have been raised under cover. Support peas by sticks or wire-netting. Pinch off the tops of broad beans as they come into flower to make the beans set. Plough or dig up old cauliflower and cabbage beds, and let them lie in the rough for a month before replanting, so that the soil may get the benefit of the sun and air. Top dressing, where vegetables have been planted out, with fine stable manure has a most beneficial effect on their growth, as it furnishes a mulch as well as supplies of plant food.

Flower Garden.—All the roses should have been pruned some time ago, but do not forget to look over them occasionally, and encourage them in the way they should go by rubbing off any shoots which tend to grow towards the centre. Where there is a fine young shoot growing in the right direction, cut off the old parent branch which it will replace. If this work is done gradually it will save a great deal of hacking and sawing when next pruning season arrives. Trim and repair the lawns. Plant out antirrhinums (snapdragon), pansies, hollyhocks, verbenas, petunias, &c. Sow zinnias, amaranthus, balsam, chrysanthemum, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins; and plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. In the case of dahlias, however, it will be better to place them in some warm, moist spot, where they will start gently and be ready to plant out in a month or two. It must be remembered that this is the driest of our months. During thirty-eight years the average number of rainy days in August was seven, and the mean average rainfall 2.63 in., and for September 2.07 in., increasing gradually to a rainfall of 7.69 in., in February.

Orchard Notes for August.

THE COAST DISTRICTS.

The remarks that have appeared in these notes during the last few months respecting the handling and marketing of citrus fruits apply equally to the present month. The bulk of the fruit, with the exception of the latest ripening varieties in the latest districts, is now fully ripe, and should be marketed as soon as possible, so that the orchards can be got into thorough order for the Spring growth. All heavy pruning should be completed previous to the rise in the sap; and where Winter spraying is required, and has not yet been carried out, no time should be lost in giving the trunks, main branches, and inside of the trees generally a thorough dressing with lime and sulphur wash.

Where citrus trees are showing signs of failing, such as large quantities of dead or badly diseased wood in the head of the tree, they can (provided the root system is healthy) be renovated by cutting back the entire top of the tree till nothing but sound heathy wood is left. This should be thinned out, only sufficient main limbs being left from which to form a well-balanced tree, and the trunk and limbs so left should receive a dressing of lime sulphur, or Bordeaux paste.

Healthy trees that are only producing inferior fruit should be treated in a similar manner, and be either grafted with an approved variety direct or be allowed to throw out new growth, which can be budded in due course. The latter method is to be preferred, and an inferior and unprofitable tree can thus be converted in the course of a couple of years into a profitable tree, producing good fruit.

Where orchards have not already been so treated, they should now be ploughed so as to break up the crust that has been formed on the surface during the gathering of the crop, and to bury all weeds and trash. When ploughed, do not let the soil remain in a rough, lumpy condition, but get it into a fine tilth, so that it is in a good condition to retain moisture for the tree's use during Spring. This is a very important matter, as Spring is our most trying time, and the failure to conserve moisture then means a failure in the fruit crop, to a greater or lesser extent.

Do not be afraid if you cut a number of surface roots when ploughing the orchard, but see that you do cut them, not tear them. Use a disc plough and keep the discs sharp, and the root-pruning the trees will thus receive will do more good than harm, as it will tend to get rid of purely surface roots.

Planting of all kinds of fruit trees can be continued, though the earlier in the month it is completed the better, as it is somewhat late in the season for this work. The preparation of land intended to be planted with pineapples or bananas should be attended to, and I can only reiterate the advice given on many occasions—viz., to spare no expense in preparing the land properly for these crops—as the returns that will be obtained when they come into bearing will handsomely repay the extra initial expense. Growers of pineapples and bananas who send their fruit to the Southern markets should take more care in the grading and packing of such fruit, as their neglect to place it on the market properly means a big difference in price, and entails a loss that could be avoided had the necessary care and attention been given. The same remarks apply to the marketing of citrus fruits, papaws, custard apples, strawberries, cucumbers, and tomatoes, all of which are in season during the month.

The pruning of all grape vines should be completed, and new plantings can be made towards the end of the month. Obtain well-matured, healthy cuttings, and

plant them in well and deeply worked land, leaving the top bud level with the surface of the ground, instead of leaving 6 or 7 in. of the cutting out of the ground to dry out, as is often done. You want only one strong shoot from your cutting, and from this one shoot you can make any shaped vine required. Just as the buds of the vine begin to swell, but before they burst, all varieties should be dressed with sulphuric acid solution, composed of three-quarters of a pint of commercial sulphuric acid to one gallon of water; or, if preferred, this mixture can be used instead—viz., dissolve 5 lb. of sulphate of iron (pure copperas) in one gallon of water, and when dissolved add to it half a pint of sulphuric acid. This is the winter treatment for the prevention of anthracnose or black spot, and for downy mildew, and should on no account be neglected.

Fruit-fly will make its appearance during the month, and citrus and other fruits are likely to be attacked. Every grower should, therefore, do his best to destroy as many flies as possible, both mature insects and larvæ, the former by trapping or otherwise, and the latter by gathering and destroying all infested fruit. If this work is carried out properly, a large number of flies that would otherwise breed out will be destroyed, and the rapid increase of the pest be materially lessened. The destruction of fruit-flies early in the season is the surest way of checking this serious pest.

Keep a careful lookout for orange-sucking bugs, and destroy every mature or immature insect or egg that is seen. If this work is done thoroughly by all citrus growers there will be far fewer bugs to deal with later on, and the damage caused by this pest will be materially reduced. Destroy all elephant beetles seen on young citrus trees, and see that the stems and main forks of the trees are painted with a strong solution of lime sulphur.

GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

The pruning of all deciduous trees should be finished during the month, and all such trees should be given their annual winter spraying with lime sulphur. The planting of new orchards should, if possible, be completed, as it is not advisable to delay. Later planting can be done in the Granite Belt, but even there earlier planting is to be preferred.

Peach trees, the tops of which have outlived their usefulness and of which the roots are still sound, should be cut hard back so as to produce a new top which will yield a good crop of good fruit the following season in from fifteen to eighteen months, according to the variety.

Apple, pear, or plum trees that it is desirable to work over with more suitable varieties should also be cut hard back and grafted. All almond, peach, nectarine, and Japanese plum trees should be carefully examined for black peach aphis, as, if the insects which have survived the Winter are systematically destroyed, the damage that usually takes place from the ravages of this pest later on will be materially lessened.

Woolly aphis should also be systematically fought wherever present. The best all-round remedy for these two pests is spraying with black leaf 40.

In the warmer parts of these districts the pruning of grape vines should be completed, and they should receive their Winter dressing for black spot and downy mildew, as recommended for the Coast. In the Granite Belt the pruning of vines should, however, be delayed to as late in the season as possible, so as to keep the growth back and thus endeavour to escape late Spring pests.

Where orchards and vineyards have been pruned and sprayed, the land should be ploughed and brought into a state of as nearly perfect tilth as possible, so as to retain the moisture necessary for the proper development of the trees or vines and the setting of their fruit.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MAY, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING MAY, 1923 AND 1922, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	May.	No. of Years' Records.	May, 1923.	May, 1922.
North Coast.	In.		In.	In.
Atherton	2·19	22	0·10	1·29
Cairns	4·73	41	1·14	3·94
Cardwell	3·78	51	1·15	1·34
Cooktown	3·14	47	0·30	1·46
Herberton	1·78	36	0·49	1·16
Ingham	3·70	31	3·72	1·79
Innisfail	13·00	42	3·71	9·65
Mossman	3·54	15	0·42	4·25
Townsville	1·41	52	0·69	0·23
Central Coast.				
Ayr	1·26	36	...	0·53
Bowen	1·38	52	0·77	0·07
Charters Towers ...	0·84	41	0·07	0·10
Mackay	3·96	52	...	2·03
Proserpine	5·26	20	...	1·66
St. Lawrence ...	1·91	52	...	0·92
South Coast.				
Biggenden	1·89	24	0·06	0·27
Bundaberg	2·76	40	...	0·51
Brisbane	2·85	72	0·39	2·01
Childers	2·35	28	..	0·50
Crohamhurst ...	5·14	30	0·89	3·50
Esk	2·11	36	0·44	0·31
Gayndah	1 60	52	...	...
Gympie	3 05	53	0.67	1·69
Glasshouse Mts. ...	3 78	15	1.24	4·63
Kilkivan	1 96	44	0·25	0·17
Maryborough ...	3·13	52	0·75	1·60
South Coast—continued:	In.		In.	In.
Nambour	5·11	27	2·02	5·33
Nanango	1·64	41	0·10	0·16
Rockhampton ...	1·73	52	0·01	0·15
Woodford	3·00	36	2·45	1·47
Darling Downs.				
Dalby	1·36	53	0·31	0·20
Emu Vale	1·22	27	0·18	0·12
Jimbour	1·23	35	1·03	...
Miles	1·57	38	0·03	..
Stanthorpe ...	1·97	50	0·25	0·06
Toowoomba ...	2·31	51	0·42	0·18
Warwick	1·63	58	0·08	0·03
Maranoa.				
Roma	1·47	39	0·12	0·02
State Farms, &c.				
Bungeworgorai ...	0·67	9	0·05	0·05
Gatton College ...	1.84	24	0·12	0·02
Gindie	1·09	24	...	...
Hermitage ...	1·34	17	0·12	...
Kairi	2·34	9	*	1·10
Sugar Experiment Station, Mackay	3·64	26	...	1·42
Warren	1·24	9	...	...

* Not received.

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for May, 1923, and for the same period of 1922, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
State Meteorologist.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1923.	July.		August.		September.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·46	5·6	6·36	5·20	6·9	5·36
2	6·46	5·6	6·35	5·21	6·8	5·36
3	6·46	5·6	6·34	5·22	6·7	5·37
4	6·46	5·6	6·33	5·23	6·6	5·37
5	6·46	5·6	6·32	5·24	6·4	5·38
6	6·46	5·7	6·31	5·24	6·3	5·38
7	6·46	5·7	6·31	5·24	6·2	5·39
8	6·46	5·7	6·31	5·24	6·0	5·39
9	6·46	5·8	6·30	5·24	5·59	5·40
10	6·45	5·8	6·29	5·25	5·58	5·40
11	6·45	5·9	6·29	5·25	5·57	5·41
12	6·45	5·10	6·28	5·26	5·56	5·42
13	6·44	5·11	6·27	5·27	5·54	5·43
14	6·44	5·12	6·26	5·28	5·53	5·44
15	6·43	5·12	6·25	5·29	5·52	5·44
16	6·43	5·12	6·25	5·29	5·51	5·44
17	6·43	5·12	6·24	5·29	5·50	5·44
18	6·43	5·13	6·23	5·30	5·49	5·45
19	6·43	5·13	6·22	5·30	5·48	5·45
20	6·43	5·13	6·21	5·30	5·47	5·45
21	6·42	5·14	6·20	5·31	5·46	5·45
22	6·42	5·14	6·19	5·31	5·45	5·46
23	6·42	5·14	6·18	5·31	5·44	5·46
24	6·42	5·15	6·17	5·32	5·43	5·46
25	6·41	5·15	6·16	5·32	5·42	5·46
26	6·41	5·16	6·15	5·33	5·41	5·47
27	6·40	5·17	6·14	5·33	5·39	5·47
28	6·40	5·17	6·13	5·34	5·38	5·48
29	6·39	5·18	6·12	5·35	5·36	5·48
30	6·38	5·18	6·11	5·35	5·35	5·49
31	6·37	5·19	6·10	5·36	...	...

PHASES OF THE MOON, OCCULTATIONS, &c.

6 July ☽ Last Quarter 11 56 a.m.
14 „ 🌑 New Moon 10 45 a.m.
21 „ ☾ First Quarter 11 32 a.m.
28 „ ○ Full Moon 8 33 a.m.

7th July, Apogee, 9·48 p.m.
22nd „ Perigee 11·54 a.m.

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5 Aug. ☽ Last Quarter 5 22 a.m.
12 „ 🌑 New Moon 9 17 p.m.
19 „ ☾ First Quarter 4 7 p.m.
26 „ ○ Full Moon 8 29 p.m.

4th Aug. Apogee, 4·24 p.m.
16th „ Perigee, 8·0 p.m.

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3 Sept. ☽ Last Quarter 10 47 p.m.
11 „ 🌑 New Moon 6 53 a.m.
17 „ ☾ First Quarter 10 4 p.m.
25 „ ○ Full Moon 11 16 a.m.

1st Sept. Apogee, 10·54 a.m.
13th „ Perigee, 8·24 a.m.
29th „ Apogee, 3·24 a.m.

During July the planet Mercury will pass eastwards, apparently from the constellation Taurus, through Gemini and Cancer into Leo. Venus will also appa ently pass from Taurus through Gemini into Cancer, Mars from Gemini into Cancer. Jupiter will seem to move only about one degree eastward in Libra, while Saturn will apparently move about a degree and a half further east amongst the stars of Virgo.

From 1st August to 30th September Mercury and Venus will apparently move on through Leo into Virgo, and Mars from the eastern part of Cancer to that of Leo. Jupiter will apparently move only about eight degrees further east in Libra, and Saturn about five and a half degrees in Virgo.

A partial eclipse of the moon, visible in Queensland, will take place about 9 o'clock in the evening of 26th August.

A total eclipse of the sun will take place a fortnight later, visible only in the North Pacific, Central America and Gulf of Mexico.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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QUEENSLAND AGRICULTURAL JOURNAL

Vol. XX. AUGUST, 1923. Part 2.

Event and Comment.

The Current Issue.

"The Sweet Potato," with illustrations in colour, is strongly featured in this issue. An abridged report of the Fruitgrowers' Conference, at which concrete proposals for better organisation of the industry were considered, covers many matters of interest to agriculturists generally. The whole farming industry will naturally be interested in the aim of the orchardists towards working out their economical salvation on tested co-operative lines and the development of that aim will be watched very closely by all concerned. The second instalment of a special contribution on irrigation in Queensland dealing with the Burdekin and other sugar district projects, is opportune in view of awakened public interest in closer settlement. A paper on some faults in the manufacture of cheese will be useful to those engaged in one of our rapidly expanding industries. In a continuation of a summary of experiments by the Bureau of Sugar Experiment Stations some valuable tables of soil and other chemical analysis are presented. The full text of the Governor's Speech, containing an important agricultural programme for the current Parliamentary session, will be read with interest. The regular features include some valuable entomological notes from the Northern sugar areas, and contain generally much useful information. This number is well and profusely illustrated.

Agriculture and the University.

The Senate of the Queensland University has under consideration definite proposals for an agricultural education scheme. Widespread public interest has been aroused by various authoritative references to the possibilities of a co-ordinated scheme of agricultural education, leading right from the primary schools up to, and including the University. The transfer of the Gatton Agricultural College from the Department of Agriculture to the Department of Public Instruction would seem to indicate that this institution, instead of remaining a detached fragment as heretofore, in the general scheme of State education, is now to take its place in one co-ordinated scheme of agricultural education.

The Fruit Industry and Its Difficulties.

At the recent conference of fruitgrowers arranged by the Council of Agriculture a decisive stage was reached on the march towards effective organisation. Though some time was wasted over non-essentials, the conference got down to hard business in the proposals that were ultimately adopted. The Committee of Direction, in its efforts to give effect to the definite proposals agreed to by the conference will, however, find the track ahead anything but easy going. The enormous difficulties facing the fruitgrowers have become evident by the operation of the Federal fruit pools, and those difficulties will continue until the selling end of the industry is completely organised. The problem of marketing must be tackled energetically, and, judging by the tone of the conference, the ability displayed by the delegates and their constructive criticism of the proposals, the problem is seen by those concerned in its right perspective. On the main point at issue—the securing of Parliamentary authority for the Committee of Direction—the conference was practically unanimous, and there is every reason to believe that through this committee the growers will exercise a power to control effectively the marketing of their products. The use of this power will not necessarily mean the substitution of existing methods and channels of distribution, but will make, rather, for more efficient handling and marketing in the interests of all connected with the industry, including those directing existing agencies. At present growers have to bear all seasonal risks, pay full prices for fertilisers, plant, and other material necessary for production, engage in a never-ending fight against pests, and, from a marketing point of view, they are handicapped by the perishable nature of their produce. On top of all these disabilities is an archaic marketing system. The simple desires of the growers may be reduced to the placing of the industry on a sound foundation and the securing of net returns in reasonable ratio to the cost of production.

The Conference Scheme in Brief.

By a system of well-organised marketing it is aimed to reduce the risks of recurring gluts that benefit neither the man in the field nor the man in the market, and to stabilise prices so that heavy crops will not necessarily mean low returns. Changes, if any, in existing methods will be brought about gradually. Control of the industry will be vested in a Committee of Direction, representing all sections of the industry in all parts of the State. The committee will connect closely with the growers through sectional groups. In pineapples, bananas, and citri, the sectional groups will correspond to the advisory council's elected by the several sections; but in respect to Stanthorpe deciduous fruits, the District Council of Agriculture, with representatives of other deciduous fruit-producing areas, like Roma and Pinkenba, where grapes are extensively grown, will assume the necessary responsibility. With this arrangement in force, the policy of the Committee of Direction will be reviewed from time to time and its members kept in touch with the requirements of each section represented on that body. The success, or otherwise, of the scheme will depend upon the growers themselves. In its nature it is evolutionary and it will certainly be some time before its benefits will be felt. A practical working basis must first be established and then should follow an extension of operations on common-sense business lines.

The Meat Industry—Scheme for Uplift.

As a result of representations made by a number of local producers' associations, whose members are interested in grazing, a Graziers' Subcommittee has been constituted by the Council of Agriculture for the purpose of evolving a scheme for improving the conditions affecting the beef cattle industry. At its first meeting the subcommittee realised that if anything of a practical nature were to be achieved it would be necessary to obtain the support of all organisations interested. At the June meeting of the Council of Agriculture it was, therefore, decided that a joint committee representative of the Council, State Meat Advisory Board, Cattle Owners' Association, and the Roma Conference be appointed for the purpose of unifying the activities of the various organisations with a view to definitely alleviating the lamentable conditions at present surrounding one of the most important industries of the State. At a subsequent meeting of the joint committee nineteen more cattle owners from all parts of the State, who had attended to hear the discussion, were appointed. An outcome of the proceedings was the appointment of a strong and representative subcommittee carrying instructions to formulate a scheme embodying the principle of compulsory co-operation connected with the sales of Queensland cattle, providing for the retention of entire control by the cattle owner, and the charging of the necessary administrative fund to the proceeds of sales. The decisions of the graziers were conveyed by deputation to the Minister for Agriculture and Stock (Hon. W. N. Gillies), who advised the deputation to work under the auspices of the Council of Agriculture. The Minister promised to refer the proposals to the Council and consult the Crown Solicitor as to their legal aspect.

A SUMMARY OF SOME EXPERIMENTS CARRIED OUT BY THE BUREAU OF SUGAR EXPERIMENT STATIONS.—VIII.

The Director of Sugar Experiment Stations, Mr. H. T. Easterby, commenced this series in the May (1922) Journal, and in his opening article discussed deep cultivation experiments and tabulated comparative crop result from subsoiled and non subsoiled fields. The second instalment, an account of results of irrigation experiments and the action of irrigation and manures upon the density and purity of sugar juices, appeared in the June (1922) issue. In the August number Mr. Easterby's notes covered experiments in fertilisation, and were followed in the succeeding issue by an account of distance experiments and resultant crops. In the October (1922) number the summary was continued with notes on the introduction and testing of cane varieties. In the February Journal experiments to determine if cane sets cut from arrowed canes have a prejudicial effect on the germination and subsequent yield were discussed. In his introduction to the Summary of Experiments above mentioned, the Director stated that a summary of the chemical work accomplished by the Bureau, to be prepared by Mr. George R. Patten, formerly Chief Chemist to the Bureau, would also be presented. Mr. Patten has now completed this summary, which entailed a great deal of elaborate work and occupied much time. The results will appear from time to time in the Journal until complete, when the whole summary will then be published in bulletin form.—Ed.

SOIL AND OTHER CHEMICAL ANALYSES—*continued.*

Summarised by GEORGE R. PATTEN, Analyst, Agricultural Laboratory, Brisbane, formerly Chief Chemist, Bureau of Sugar Experiment Stations.

The following summary includes the average analyses of Hatton (Mackay) and Alton Downs (Rockhampton) soils. Typical examples of good, bad, and wallum soils, average agricultural analyses of composite samples of soils from different districts, also showing solvent action of various acids in a 1 per cent. solution on composite soils, and water absorption and retentive power of soils. Further tables are included comprising the nitrogen and ash analyses of sugar-cane.

AVERAGE ANALYSES OF HATTON (MACKAY) AND ALTON DOWNS (ROCKHAMPTON) SOILS.

—	Total Elements in Soil.				Available Elements in Soil.		
	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Hatton (Mackay)	0·615	0·235	0·203	0·154	0·1112	0·0046	0·0024
Alton Downs (Rockhampton)	1·520	0·325	0·166	0·150	0·4616	0·0072	0·0038

—	Total Pounds per Acre.				Available Pounds per Acre.		
	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
Hatton (Mackay)	22,487	6,600	6,525	3,800	3,170	192	57·5
Alton Downs, (Rockhampton)	38,000	8,125	4,650	3,750	11,540	180	95

The Hatton soils compare favourably with those of other sugar districts. In regard to total elements they are for the most part well up to standard, though the available potash is rather low. This, however, is a matter which may improve on cultivation, as the total amount is quite up to standard, and apparently only requires being made available.

TYPICAL EXAMPLES OF GOOD AND BAD SOILS FOR SUGAR OR ANY OTHER KINDS OF AGRICULTURAL CROPS.

Soil.	Total Elements in Soil.				Available Elements in Soil.		
	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Good	·916	·344	·188	·103	·1650	·0344	·0078
Bad	·210	·250	·160	·173	·0087	·0049	·0003
Wallum	·063	·061	·072	·042	·0097	·0036	·0012

ELEMENTS PER ACRE TO THE DEPTH OF ONE FOOT.

——	Total Pounds per Acre.				Available Pounds per Acre.		
	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Potash.	Phosphoric Acid.
Good	27,480	10,320	5,640	3,090	4,950	1,032	234
Bad	6,200	7,500	4,800	5,190	261	147	9
Wallum	1,575	1,525	1,800	1,050	243	90	30

These examples are given—first, on account of their general value, showing the wide differences in the chemical composition of "good" and "bad" soils; and secondly, because of special examples, which accentuate the great difference described and also showing the essential need of soil analyses.

The two tables next set out represent the average agricultural analyses of composite samples of soil from the sugar districts between Bundaberg and Mossman, also the relative solvent action of various acids upon such composite samples. For lands upon which sugar-cane is grown, Maxwell's aspartic acid method was considered the most useful, and the one which approximates most closely in showing the amount of the necessary elements available for cane crops.

AVERAGE AGRICULTURAL ANALYSES OF COMPOSITE SAMPLES OF SOIL.

Locality.	Moisture.	Volatile Matter.	Insoluble Residue.	Chlorine.	Phosphoric Acid.	Ferric Oxide.	Alumina.	Lime.	Magnesia.	Potash.	Soda.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent
Mossman, Hambledon, Mulgrave (alluvial)	1·717	6·029	74·653	·003	·136	4·122	8·940	·271	·435	·481	·180
Innisfail, Mourilyan, Halifax, Ripple Creek, and Ingham (alluvial)	2·808	7·696	71·644	·003	·164	5·414	10·941	·324	·472	·240	·152
Innisfail and Mulgrave (bastard red soils)	3·444	13·182	50·953	·004	·264	13·009	18·592	·159	·256	·248	·157
Mackay and Proserpine (alluvial)	2·349	6·760	79·013	·004	·174	3·969	5·932	·753	·520	·200	·207
Burdekin (alluvial) ..	2·334	6·139	80·439	·004	·187	3·414	5·166	·958	·734	·348	·144
Isis Level Land Soils (volcanic)	2·558	11·255	53·943	·003	·247	14·336	16·726	·344	·277	186	·092
Woongarra, Bundaberg (volcanic)	3·733	13·985	43·641	·004	·407	15·267	21·613	·604	·329	·139	·130
Bingera (red soils) ..	1·965	8·436	69·210	·009	·201	6·548	12·842	·365	·177	·187	·114

TABLE SHOWING THE SOLVENT ACTION OF VARIOUS ACIDS UPON COMPOSITE SAMPLE OF SOILS USING 1 PER CENT. SOLUTIONS OF EACH ACID.

Locality.	Name of Solvent. 1 %.	Analysis Calculated to the % of the Soil.					
		Silica.	Ferric Oxide and Alumina.	Phosphoric Acid.	Lime.	Potash.	Soda.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Mossman, Mulgrave, and Hambledon—*Alluvial*	Aspartic acid ..	·0092	·0093	·0013	·0880	·0121	·0104
	Acetic acid ..	·0049	·0055	·0013	·0821	·0085	·0092
	Citric acid ..	·0274	·1558	·0037	·0843	·0142	·0122
	Hydrochloric acid	·1066	·3572	·0045	·1216	·0187	·0090
Innisfail, Mourilyan Halifax, Ripple Creek, and Ingham —*Alluvial*	Aspartic acid ..	·0810	·0111	·0014	·0830	·0104	·0119
	Acetic acid ..	·0080	·0054	·0020	·0705	·0067	·0019
	Citric acid ..	·1016	·2060	·0035	·0798	·0136	·0151
	Hydrochloric acid	·1742	·5898	·0042	·1450	·0163	·0117
Innisfail and Mulgrave —*Bastard Red Soils*	Aspartic acid ..	·0076	·0297	·0010	·0608	·0132	·0098
	Acetic acid ..	·0038	·0177	·0021	·0581	·0090	·0113
	Citric acid ..	·0233	·2614	·0017	·0555	·0157	·0135
	Hydrochloric acid	·0866	·5865	·0025	·0736	·0162	·0093
Mackay and Proserpine —Soils, *Alluvial*	Aspartic acid ..	·0134	·0078	·0017	·1280	·0051	·0060
	Acetic acid ..	·0116	·0016	·0014	·1103	·0073	·0094
	Citric acid ..	·0746	·2365	·0071	·1480	·0080	·0129
	Hydrochloric acid	·2079	·6578	·0075	·3240	·0154	·0160
Burdekin — Soils, *Alluvial*	Aspartic acid ..	·0235	·0044	·0174	·1783	·0084	·0142
	Acetic acid ..	·0140	·0020	·0107	·1508	·0057	·0103
	Citric acid ..	·0723	·1711	·0367	·2215	·0101	·0171
	Hydrochloric acid	·2042	·4943	·0490	·5230	·0218	·0168
Isis Level Land—Soils, *Volcanic*	Aspartic acid ..	·0254	·0091	·0017	·1593	·0097	·0077
	Acetic acid ..	·0186	·0030	·0015	·1411	·0110	·0050
	Citric acid ..	·0532	·2114	·0027	·1640	·0173	·0124
	Hydrochloric acid	·1036	·4300	·0042	·2713	·0259	·0262
Woongarra, Bundaberg —Soils, *Volcanic*	Aspartic acid ..	·0681	·0057	·0018	·2755	·0083	·0074
	Acetic acid ..	·0465	·0005	·0017	·2545	·0079	·0065
	Citric acid ..	·0993	·2825	·0051	·2915	·0132	·0107
	Hydrochloric acid	·1932	·6267	·0106	·5174	·0282	·0329
Bingera—Soils, *Red* ..	Aspartic acid ..	·0324	·0097	·0017	·1680	·0048	·0082
	Acetic acid ..	·0263	·0012	·0018	·1653	·0047	·0086
	Citric acid ..	·0576	·1887	·0036	·1755	·0084	·0101
	Hydrochloric acid	·0943	·4118	·0062	·2233	·0208	·0269

The following table, which is a highly interesting one, shows the average per centage of organic matter, water absorbed, and water retained of the various sugar districts of Queensland. It must be borne in mind, however, that being artificial tests in a laboratory the percentages of water retained and absorbed are valuable in a comparative sense only :—

TABLE SHOWING THE AVERAGE PERCENTAGE OF COMBINED WATER AND ORGANIC MATTER, WATER ABSORBED, AND WATER RETAINED OF VARIOUS SUGAR DISTRICTS OF QUEENSLAND.

District.	Sub-district.	Combined Water and Organic Matter.	Water Absorbed.	Water Retained.
		Per cent.	Per cent.	Per cent.
Cairns	Mossman	6·52	39·62	2·03
	Kamerunga	3·55	34·10	1·15
	Hambledon	5·33	36·19	1·63
	Mulgrave (red soils)	7·15	39·69	2·84
	Mulgrave (alluvial soils) ..	5·72	40·90	2·40
	Innisfail (red soils)	15·98	46·01	5·17
	Innisfail (alluvial soils)	11·89	49·18	5·77
	Mourilyan	11·93	45·02	4·51
	Halifax	5·64	41·47	2·91
	Ingham	4·88	39·17	2·09
	Ripple Creek	5·82	42·18	2·82
	Burdekin	6·48	43·65	3·39
Mackay ..	Proserpine	8·22	43·93	4·70
	Homebush	4·08	34·63	1·63
	Mackay (river banks)	5·92	39·23	2·83
	North Eton	4·55	37·41	2·03
	Plane Creek (forest)	10·77	43·55	6·14
	Plane Creek (scrub and low flats)	7·02	40·84	3·44
	North of River and Farleigh ..	9·63	43·25	5·74
	Sunnyside	6·34	42·33	3·70
Bundaberg ..	Isis (level lands)	11·34	43·80	3·41
	Isis (hill sides)	12·73	46·58	3·44
	Woongarra	13·97	51·45	4·46
	Bingera	8·39	38·63	2·41
	Watawa	12·03	43·44	4·64
	Gin Gin (forests)	8·71	41·08	3·63
	Gin Gin (river flats)	7·33	41·74	3·38
	Birthamba	7·85	34·52	1·69
	Sharon, Oakwood, Kalbar, and Bonna	5·86	36·36	2·44
	Fairymead	9·10	47·14	4·48
	Avondale	5·67	42·58	3·51
	Miara	15·65	73·95	6·89
	Invicta	8·09	39·94	3·21
	Gooburrum	3·95	30·49	1·06
	Pialba	8·12	33·47	2·72
	Nerang	8·89	54·00	4·46
	Mount Bauple (red)	8·04	40·31	2·49
	Mount Bauple (grey)	6·96	35·76	2·35
	Beenleigh	8·08	41·81	4·54
	Nambour	10·60	43·82	4·28
	Goodwood	11·84	43·81	3·20

NITROGEN AND ASH ANALYSES (53 DETERMINATIONS) IN DIFFERENT VARIETIES OF SUGAR CANE, INCLUDING TOPS.

Variety of Cane.	Locality.	Type of Soil.	PER CENT. IN DRY MATTER OF CANE (INCLUDING TOP)		Mineral Constituents of the Ash.									
			Nitrogen.	Crude Ash.	Silica, SiO_2.	Ferric Oxide, Fe_2O_3.	Manganese Oxide, MnO.	Lime, CaO.	Magnesia, MgO.	Potash, K_2O.	Soda, Na_2O.	Sulphuric Anhydride, SO_3.	Chlorine, Cl.	Phosphoric Acid, P_2O_5.
			Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Demarara 1135 ..	Pialba	Grey scrub soil	·707	4·27	·69	·05	trace	·08	·15	1·83	·05	·48	·38	·14
Do. ..	Cordalba	Red volcanic soil	·472	3·01	·54	·04	·01	·19	·09	1·29	·20	·63	·10	·13
Do. ..	Childers	do.	·354	1·95	·61	·03	·01	·14	·18	·42	·08	·30	·14	·11
Do. ..	Goodwood	do.	·509	2·93	·64	·06	·01	·15	·16	·88	·08	·26	·15	·17
Do. ..	East Bundaberg ..	Alluvial soil ..	·598	4·46	1·24	·05	·01	·13	·17	1·57	·12	·34	·22	·25
Do. ..	Bonna, near Bundaberg ..	do.	·435	3·45	·92	·05	trace	·12	·13	1·27	·05	·23	·22	·32
Do. ..	Woongarra, near Bundaberg	Red volcanic soil	·371	3·26	1·03	·07	do.	·14	·12	·99	·10	·35	·35	·21
Do. ..	Bingera	do.	·594	3·54	1·06	·04	do.	·16	·16	1·17	·07	·34	·21	·19
Do. ..	Bingera	Alluvial soil ..	·470	4·57	·67	·04	·01	·16	·12	1·84	·08	·10	·43	·19
Do. ..	Oakwood, near Bundaberg	Red volcanic soil	·649	4·46	1·24	·09	trace	·15	·13	1·37	·16	·45	·38	·30
Do. ..	Mossman	Alluvial ..	·349	1·91	·64	·03	·01	·10	·20	·47	·07	·14	·07	·13
Badila, New Guinea 15	Woongarra, near Bundaberg	Red volcanic soil	·405	3·30	1·52	·09	trace	·18	·11	·80	·09	·19	·14	·21
Do. ..	Bonna, near Bundaberg ..	Alluvial soil ..	·447	4·23	2·03	·04	·01	·13	·15	1·05	·14	·21	·22	·40
Do. ..	Proserpine	do.	·370	3·12	1·79	·08	trace	·19	·16	·58	·09	·09	·11	·16
Do. ..	Burdekin	do.	·298	3·91	1·65	·03	do.	·19	·16	1·09	·12	·16	·21	·24
Do. ..	Ingham	do.	·535	3·11	1·45	·04	·01	·12	·11	·95	·14	·07	·13	·20
Do. ..	Innisfail	Red volcanic ..	·416	1·69	·53	·04	·01	·16	·12	·39	·10	·12	·09	·10
Do. ..	Nelson, near Cairns ..	do.	·389	2·60	·82	·06	·01	·12	·10	·81	·11	·06	·10	·30
Do. ..	Mossman	Alluvial ..	·481	3·31	1·13	·03	trace	·15	·17	1·01	·08	·17	·16	·30

NITROGEN AND ASH ANALYSES (53 DETERMINATIONS) IN DIFFERENT VARIETIES OF SUGAR CANE, INCLUDING TOPS—*continued.*

Variety of Cane.	Locality.	Type of Soil.	PER CENT. IN DRY MATTER OF CANE (INCLUDING TOP).		Mineral Constituents of the Ash.									
			Nitrogen.	Crude Ash.	Silica, SiO_2.	Ferric Oxide, Fe_2O_3.	Manganese Oxide, MnO.	Lime, CaO.	Magnesia, MgO.	Potash, K_2O.	Soda, Na_2O.	Sulphuric Anhydride, SO_3.	Chlorine, Cl.	Phosphoric Acid, P_2O_5.
			Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Rappoe	Childers	Red volcanic soil	·320	2·54	·80	·04	trace	·21	·11	·69	·09	·21	·12	·12
Do. ..	East Bundaberg ..	Alluvial soil ..	·544	4·12	1·39	·07	·01	·13	·13	1·36	·11	·33	·18	·17
Do. ..	Oakwood, near Bundaberg	Red volcanic soil	·514	3·27	1·26	·08	trace	·26	·16	·67	·09	·17	·19	·27
Do. ..	Bingera	Alluvial soil ..	·325	3·78	1·12	·03	do.	·15	·10	1·26	·08	·11	·15	·21
Do. ..	Bingera	Red volcanic soil	·563	3·84	1·19	·04	do.	·25	·18	1·09	·09	·31	·23	·18
Do. ..	Bonna, near Bundaberg..	Alluvial soil ..	·326	2·94	1·06	·01	do.	·15	·11	·75	·10	·11	·12	·22
New Guinea 24B	Bonna, near Bundaberg..	Alluvial soil ..	·415	4·31	2·04	·07	trace	·11	·12	1·17	·12	·22	·26	·33
Do. ..	Proserpine	do.	·243	2·82	1·07	·04	·01	·09	·07	1·02	·09	·07	·12	·16
Do. ..	Burkedin	do.	·521	4·79	1·65	·04	·02	·17	·16	1·46	·12	·21	·19	·25
Do. ..	Ingham	do.	·319	2·91	1·00	·05	·01	·09	·09	·86	·08	·07	·11	·13
Do. ..	Nelson, near Cairns ..	Red volcanic ..	·412	2·11	·53	·04	·02	·07	·13	·67	·03	·06	·15	·11
New Guniea 24A	Proserpine	Alluvial ..	·279	2·50	1·12	·05	trace	·20	·15	·51	·13	·11	·10	·20
Do. ..	Burdekin	do.	·363	3·61	1·28	·05	·02	·18	·13	1·07	·08	·09	·13	·22
Do. ..	Ingham	do.	·232	3·17	1·20	·06	·01	·10	·10	·98	·10	·10	·16	·15
Do. ..	Innisfail	Red volcanic ..	·515	2·87	·68	·05	·03	·26	·19	·61	·13	·31	·15	·13
Mauritius Malagache	Proserpine	Alluvial ..	·364	5·43	2·52	·10	·01	·15	·25	1·28	·11	·20	·28	·30
Do. ..	Burdekin	do.	·357	4·04	1·31	·05	trace	·16	·12	1·34	·12	·18	·18	·24
Do. ..	Ingham	do.	·200	2·33	·86	·05	do.	·08	·09	·71	·09	·05	·06	·17
Do. ...	Innisfail	Red volcanic ..	·466	2·27	·77	·08	·03	·15	·12	·56	·06	·21	·15	·09

Mauritius 1900 Seedling	Cordalba	Red volcanic soil	·396	2·44	·44	·05	·01	·14	·15	·63	·08	·24	·10	·14
Do. ..	Childers	do.	·472	2·30	·74	·03	·01	·15	·12	·69	·02	·28	·09	·14
Do. ..	Goodwood	do.	·294	2·75	1·07	·06	·01	·14	·14	·66	·12	·23	·13	·12
Do. ..	Woongarra, near Bundaberg	do.	·379	4·33	·98	·06	trace	·24	·15	1·57	·06	·40	·39	·23
Striped Singapore	Pialba	Grey scrub soil	·877	4·26	·73	·06	·01	·11	·17	1·83	·05	·33	·35	·19
Do. ..	Bonna, near Bundaberg ..	Alluvial soil ..	·410	3·38	1·33	·01	trace	·13	·15	·81	·13	·12	·16	·26
Do. ..	Bingera	do.	·451	4·55	1·03	·03	do.	·15	·08	1·64	·08	·19	·19	·24
New Guinea 40 ..	Goodwood	Red volcanic soil	·518	4·05	1·18	·05	·01	·17	·18	1·28	·09	·23	·23	·17
Do. ..	Innisfail	do.	·436	3·02	·79	·03	·03	·21	·09	·83	·11	·23	·22	·09
Goru, New Guinea 24	Nelson, near Cairns ..	Red volcanic ..	·431	2·95	·73	·10	·01	·10	·16	·94	·25	·13	·20	·17
Do. ..	Mossman	Alluvial ..	·473	3·10	·54	·05	·01	·10	·15	1·08	·10	·14	·15	·22
Green Seedling, Barbadoes 156	Pialba	Grey scrub soil	·750	3·78	·61	·05	·01	·14	·17	1·57	·17	·33	·37	·16
Do. ..	Bingera	Red volcanic soil	·612	3·94	1·36	·06	trace	·26	·22	1·09	·08	·35	·22	·12
Mavoe or Batoe	Pialba	Grey scru soil	·740	4·24	·75	·05	·01	·10	·15	1·78	·04	·43	·26	·15
Black Innis ..	Woongarra, near Bundaberg	Red volcanic soil	·390	4·51	1·38	·07	trace	·23	·13	1·57	·07	·36	·41	·24

ANALYSES MADE TO DETERMINE AMOUNTS OF PLANT FOODS REMOVED FROM THE SOIL BY SUGAR-CANE.

PLOT NO. 1—CANE PLANTED IN APRIL, 1913, AND CUT OCTOBER, 1914.

Laboratory No.	Variety of Cane.		Estimated Tons per Acre.	Ash.		Lime.		Potash		Phosphoric Acid.		Nitrogen	
				Per cent.	Lb. per Acre.	Per cent.	Lb. per Acre.	Per cent.	Lb. per Acre.	Per cent.	Lb. per Acre.	Per cent.	Lb. per Acre.
1269	Hambledon, Q. 426	C.C.	40	·480	*430*	·054	*48*	·057	*51*	·063	*56*	·067	*60*
1271	Do. do.	T. and L.	10	1·545	*346*	·117	*26*	·384	*86*	·096	*21*	·202	*45*
..	Do. do.	T.C.P.	..	..	*776*	..	*74*	..	*137*	..	*77*	..	*105*
1255	Badila	C.C.	45	·486	*490*	·052	*52*	·061	*61*	·037	*37*	·065	*66*
1274	Do.	T. and L.	95	1·818	*387*	·108	*23*	·495	*105*	·105	*22*	·204	*43*
..	Do.	T.C.P.	..	..	*877*	..	*75*	..	*166*	..	*59*	..	*109*
1277	Goru	C.C.	35	·294	*230*	·044	*34*	·072	*56*	·019	*15*	·052	*41*
1273	Do.	T. and L.	4·4	1·608	*158*	·117	*11*	·351	*35*	·084	*8*	·198	*19*
..	Do.	T.C.P.	..	..	*388*	..	*45*	..	*91*	..	*23*	..	*60*
1252	Cheribon	C.C.	50	·270	*302*	·033	*37*	·056	*63*	·021	*23*	·021	*23*
1258	Do.	T. and L.	10·2	1·650	*377*	·134	*31*	·445	*102*	·076	*17*	·131	*30*
..	Do.	T.C.P.	..	..	*679*	..	*68*	..	*165*	..	*40*	..	*53*
1256	Malabar	C.C.	30	·350	*235*	·033	*22*	·083	*56*	·024	*16*	·029	*19*
1270	Do.	T. and L.	6·1	1·685	*230*	·134	*18*	·327	*45*	·056	*8*	·161	*22*
..	Do.	T.C.P.	..	..	*465*	..	*40*	..	*101*	..	*24*	..	*41*
1268	Otamite	C.C.	50	·390	*437*	·036	*40*	·090	*101*	·036	*40*	·042	*47*
1250	Do.	T. and L.	7·7	1·572	*271*	·097	*17*	·390	*67*	·050	*9*	·140	*24*
..	Do.	T.C.P.	..	..	*708*	..	*57*	..	*168*	..	*49*	..	*71*

PLOT NO. 1—CANE PLANTED IN AUGUST, 1913, AND CUT DECEMBER, 1914.

Laboratory No.	Variety of Cane.		Estimated Tons per Acre.	Ash. Per cent.	Ash. Lb. per Acre.	Lime. Per cent.	Lime. Lb. per Acre.	Potash Per cent.	Potash Lb. per Acre.	Phosphoric Acid. Per cent.	Phosphoric Acid. Lb. per Acre.	Nitrogen Per cent.	Nitrogen Lb. per Acre.
1265	Hambledon, Q. 426	C.C.	48	·377	*405*	043	*46*	·058	*62*	·055	*59*	·055	*59*
1248	Do. do.	T. and L.	11·5	1·512	*389*	·132	*34*	·405	*104*	·120	*31*	·244	*63*
..	Do. do.	T.C.P.	..	..	*794*	..	*80*	..	*166*	..	*90*	..	*122*
1257	Badila	C.C.	40	·351	*314*	·039	*35*	·054	*48*	·042	*38*	·046	*41*
1236	Do.	T. and L.	8·5	1·630	*310*	·103	*20*	·521	*99*	·118	*22*	·212	*40*
..	Do.	T.C.P.	..	..	*624*	..	*55*	..	*147*	..	*60*	..	*81*
1254	Goru	C.C.	35	·434	*340*	·041	*32*	·035	*27*	·025	*20*	·040	*31*
1237	Do.	T. and L.	5·8	1·550	*201*	·132	*17*	·467	*61*	·082	*10*	·190	*25*
..	Do.	T.C.P.	..	..	*541*	..	*49*	..	*88*	..	*30*	..	*56*
1235	Cheribon	C.C.	55	·352	*434*	·024	*30*	·092	*113*	·030	*37*	·037	*46*
1245	Do.	T. and L.	12·2	1·260	*344*	·096	*26*	·366	*100*	·066	*18*	·156	*43*
..	Do.	T.C.P.	..	..	*778*	..	*56*	..	*213*	..	*55*	..	*89*
1241	Malabar	C.C.	35	·589	*462*	·054	*42*	·180	*140*	·109	*85*	·028	*22*
1262	Do.	T. and L.	7·3	1·118	*160*	·096	*14*	·305	*44*	·060	*9*	·131	*19*
..	Do.	T.C.P.	..	..	*622*	..	*56*	..	*184*	..	*94*	..	*41*
1249	Otamite	C.C.	55	·441	*543*	036	*44*	·132	*162*	·030	*37*	·042	*52*
1260	Do.	T. and L.	9·5	1·236	*263*	·095	*20*	·380	*81*	·060	*13*	·140	*30*
..	Do.	T.C.P.	..	..	*806*	..	*64*	..	*243*	..	*50*	..	*82*

PLOT NO. 2—CANE PLANTED IN APRIL, 1913, AND CUT OCTOBER, 1914.

Laboratory No.	Variety of Cane.		Estimated Tons per Acre.	Ash.		Lime.		Potash.		Phosphoric Acid.		Nitrogen.	
				Per cent.	Lb. per Acre.	Per cent.	Lb. per Acre.	Per cent.	Lb. per Acre.	Per cent.	Lb. per Acre.	Per cent.	Lb. per Acre.
1264	Hambledon, Q. 426	C.C.	40	·447	*400*	·045	*40*	·081	*73*	·048	*43*	·130	*116*
1275	Do. do.	T. and L.	11·2	1·503	*377*	·077	*19*	·431	*108*	·071	*18*	·161	*40*
..	Do. do.	T.C.P.	..	..	*777*	..	*59*	..	*181*	..	*61*	..	*156*
1276	Badila	C.C.	45	·264	*266*	·033	*33*	·049	*49*	·027	*27*	·064	*64*
1234	Do.	T. and L.	10	1·495	*335*	·130	*29*	·404	*90*	·077	*17*	·192	*43*
..	Do.	T.C.P.	..	..	*601*	..	*62*	..	*139*	..	*44*	..	*107*
1279	Goru	C.C.	35	·480	*376*	·060	*47*	·060	*47*	·021	*16*	·067	*52*
1272	Do.	T. and L.	4·6	1·713	*176*	·117	*12*	·396	*41*	·090	*9*	·219	*23*
..	Do.	T.C.P.	..	..	*552*	..	*59*	..	*88*	..	*25*	..	*75*
1266	Cheribon	C.C.	50	·354	*396*	·034	*38*	·097	*109*	·023	*26*	·036	*40*
1261	Do.	T. and L.	10·7	1·758	*421*	·111	*27*	·561	*134*	·063	*15*	·173	*41*
..	Do.	T.C.P.	..	..	*817*	..	*65*	..	*243*	..	*41*	..	*81*
1280	Malabar	C.C.	30	·610	*410*	·055	*37*	·152	*102*	·039	*26*	·060	*40*
1281	Do.	T. and L.	6·4	2·197	*315*	·177	*25*	·533	*76*	·067	*10*	·173	*25*
..	Do.	T.C.P.	..	..	*725*	..	*62*	..	*178*	..	*36*	..	*65*
1278	Otamite	C.C.	50	·357	*400*	·036	*40*	·090	*101*	·024	*27*	·059	*66*
1259	Do.	T. and L.	9·6	1·362	*285*	·093	*19*	·504	*105*	·078	*16*	·185	*39*
..	Do.	T.C.P.	..	..	*685*	..	*59*	..	*206*	..	*43*	..	*105*

PLOT NO. 2—CANE PLANTED IN AUGUST, 1913, AND CUT DECEMBER, 1914.

Laboratory No.	Variety of Cane.		Estimated Tons per Acre.	Ash Per cent.	Ash Lb. per Acre.	Lime Per cent.	Lime Lb. per Acre.	Potash Per cent.	Potash Lb. per Acre.	Phosphoric Acid Per cent.	Phosphoric Acid Lb. per Acre.	Nitrogen Per cent.	Nitrogen Lb. per Acre.
1239	Hambledon, Q. 426	C.C.	48	·367	*395*	·069	*74*	·055	*59*	·061	*66*	·049	*53*
1246	Do. do.	T. and L.	10·7	1·626	*390*	·102	*24*	·432	*104*	·072	*17*	·181	*43*
..	Do. do.	T.C.P	..	..	*785*	..	*98*	..	*163*	..	*83*	..	*96*
1243	Badila	C.C.	40	·400	*358*	·034	*30*	·060	*54*	·040	*36*	·040	*36*
1263	Do.	T. and L.	7·9	1·341	*237*	·078	*14*	·428	*76*	·064	*11*	·155	*27*
..	Do.	T.C.P.	..	..	*595*	..	*44*	..	*130*	..	*47*	..	*63*
1242	Goru	C.C.	35	·244	*191*	·031	*24*	·044	*34*	·019	*15*	·035	*27*
1247	Do.	T. and L.	73	1·456	*238*	·104	*17*	·389	*64*	·098	*16*	·200	*33*
..	Do.	T.C.P.	..	..	*429*	..	*41*	..	*98*	..	*31*	..	*60*
1240	Cheribon	C.C.	55	·529	*652*	·051	*63*	·080	*99*	·029	*36*	·199	*245*
1244	Do.	T. and L.	10·8	1·698	*411*	·146	*35*	·376	*91*	·058	*14*	·151	*36*
..	Do.	T.C.P.	..	..	*1,063*	..	*98*	..	*190*	..	*50*	..	*281*
1253	Malabar	C.C.	35	·690	*541*	·048	*38*	·183	*143*	·123	*96*	·059	*46*
1251	Do.	T. and L.	6·0	1·089	*146*	·096	*13*	·271	*36*	·041	*5*	·126	*17*
..	Do.	T.C.P.	..	..	*687*	..	*51*	..	*179*	..	*101*	..	*63*
1267	Otamite	C.C.	55	·359	*442*	·033	*41*	·101	*124*	·030	*37*	·085	*105*
1238	Do.	T. and L.	12·0	1·624	*436*	·154	*41*	·420	*113*	·068	*18*	·177	*48*
..	Do.	T.C.P.	..	..	*878*	..	*82*	..	*237*	..	*55*	..	*153*

C.C., Crushable Cane. T. and L., Tops and Leaves. T.C.P. Total Cane Plant.

This shows the pounds of lime, potash, phosphoric acid, and nitrogen removed in crops of cane of the weight grown. It is noteworthy that more potash is removed than nitrogen, lime, or phosphoric acid in these cane crops. This table requires special study in relation to the application of fertilisers.

THE QUEENSLAND CHEESE INDUSTRY.

Points of a Paper read before the Queensland Dairy Factory Managers Conference on "Some Faults in Our Cheese Industry from the Dairy Farms to the Market," by Mr. R. M. K. Snell, Cheese Instructor, Department of Agriculture and Stock.

It would be impossible to enunciate all the faults connected with the subject in one short paper, but the following are some of the principal defects the lecturer had observed in carrying out his duties as Instructor in Cheesemaking.

AT THE DAIRY FARM.

Situation of Premises.

Apart from the construction of dairy premises, a subject beyond the range of this paper, the situations of a big majority of our dairy premises are wrong. They should be so situated as to admit of good drainage, and bails should front the north so as to allow of as much sunlight as possible to enter them. One of the greatest faults, however, in the situation of dairy premises is that cattle are allowed to traverse the whole surroundings, rendering it impossible to select a clean, dustless spot upon which to erect a suitable milk-storage room. Dairymen would be well advised to give this latter fault serious consideration and rearrange the fences of their dairy premises so as to admit of one side being kept free from traffic. Generally, in the cheese districts of Queensland, the storage of milk should be provided for on the eastern side of the yards and bails.

Cleanliness in Milking.

Lack of cleanliness in milking is the cause of many serious defects in our cheese. Much improvement would be effected in its quality if dairymen would thoroughly cleanse their hands and each cow's teats before milking, thereby preventing undue contamination of the milk by harmful bacteria. Where milking machines do not receive thorough attention daily, much damage is caused to milk and consequently the cheese made therefrom.

Straining of Milk.

Considerable deterioration of milk is often caused by the use of unsuitable strainers. Strainers that cannot be easily dissembled for cleansing should not be used, and cloth strainers should, on no account, be used.

Aeration.

Milk should always be aerated immediately after milking, especially so when dairy cows are being fed with strong flavoured foods. Aeration should be carried out in as pure and dustless an atmosphere as possible. Unfortunately, many of our dairymen perform this duty in the milking sheds, or adjacent thereto, with the result that the milk becomes seriously contaminated with harmful bacteria such as *Coli Communis*, yeasts, liquifiers, and others that are always present in considerable numbers in the air surrounding milking yards and bails. As is generally known, these bacteria are the cause of some of the most serious defects in the quality of cheese.

Storage of Milk over Night.

As it is the practice only to make one delivery of milk daily at cheese factories the storage of the night's milk is an important matter. On no account should milk be stored overnight in the milking shed or adjacent thereto, as the same defect will result as instanced in the foregoing paragraph.

Colostrum Milk.

The milk from freshly calved cows, known as colostrum milk, should on no account be used for cheesemaking, as it is the cause of serious defects in the body and keeping quality of cheese. Unfortunately, some dairymen use this milk after a cow has been only a couple of days in lactation, whereas it should not be used until fully seven days have elapsed after commencement of lactation.

Preservative chemicals, watering, and partial skimming of milk have an ill effect on the quality of cheese.

Care of Utensils.

Dairy utensils must be kept thoroughly clean. Much of the trouble experienced with milk for cheesemaking is due to neglect of this duty. Immediately after use utensils should be washed with warm (not hot) water, to which has been added some washing soda or other good cleansing agent. They should them be treated with steam or boiling water, and left to drain in a clean place. Before again using it is advisable to rinse with clean cold water.

Delivery of Milk to Factory.

In concluding the dairy farm section of this paper, it is desired to point out that milk in transit from farm to factory should be protected by a suitable covering from dust and the heat of the morning sun.

CHEESE MANUFACTURE.

Given good milk, our cheesemakers are generally capable of producing a high-grade cheese, but for the benefit of young and inexperienced makers, who in the future may use the advice contained herein, some hints are briefly set out for their guidance.

Testing for Acidity at Setting.

After the milk has been received into the cheese vats the first duty of a cheese-maker is to ascertain, by means of an acidimeter, the percentage of lactic acid therein. Armed with this knowledge the maker will be greatly assisted throughout the whole of the subsequent operations, and thereby avoid many serious mistakes which may otherwise occur.

Use of Starter.

A good lactic starter should always be used, but the quantity must be in keeping with the acidity of the milk at the commencement of operations. Starters of clean pleasant aroma and clean acid flavour only must be used.

Use of Rennet.

Cheesemakers must be very sure of the quality of rennet used, and must avoid that which shows any sign of putrefaction. The quantity of rennet to be used is a consideration. Too little will cause a weak body in cheese and too much will tend to an opposite effect.

Cooking the Curd.

Unless the acid is developing quickly the cooking of the curd should proceed slowly. If the heat is raised too quickly on a soft curd, the result will be a bad cook and an injury will be done to the quality of the cheese.

Drawing the Whey.

This is one of the most important functions in the manufacture of cheese and when not done properly is the cause of serious defects. The curd at this stage should be well shrunken and shotty, but not too firm. The acidity should be such that the hot-iron test will show threads of $\frac{1}{8}$ to $\frac{1}{4}$ inch in length. It is advisable to always draw the whey when the hot iron shows this test, but if the curds are still soft and holding much moisture, it can be remedied by the addition of water the same temperature as the whey, after the whey has been drawn and before the curds have time to mat. Sufficient water must be used to just cover the curd, and if the first lot becomes too mixed with whey it can be drawn off and more added; this process should be repeated until the curds are nicely firm, when the final drawing can be made and the curds allowed to mat, to be cheddared in the usual way.

Care of Whey and Tanks.

Some of the worst faults in the flavour of cheese are caused by neglect of the whey and the whey tanks. To mention one, that of fruity flavour: Each export season much of our cheese has been graded second owing to this flavour, and it is considered that the neglect of the whey tanks, and the cleansing of milk cans after whey has been taken back to the dairy, is the most prolific cause of this defect. As soon as possible after drawing, the whey should be heated to at least 180 degrees, and after the tanks are emptied each day, they should be scrubbed with hot water and soda and then thoroughly steamed with the cover closed.

Pasteurised Cheese.

Pasteurisation of milk for cheesemaking is becoming fairly general in Queensland, and the system is expanding. I feel certain that in the near future it will be adopted by the majority of our factories. This section of the paper would not be complete unless it was pointed out that one of the worst faults found in this class of cheese during our export season is over-body. Owing to this fault, much of our cheese, which may be graded superfine here, realises no better price in London than some other makes grading second before leaving our State. I do not advocate a too soft or mushy body in pasteurised cheese, but cheesemakers should aim at a nice meaty body.

CONSTRUCTION OF THE FACTORY.

Under this section only the cheese-room is considered. Many of these are wrongly constructed and others, which are otherwise well built on good lines, are faulty in lighting. A cheese-room, to be good, must always be fitted with glass windows and outside shutters. They can then be opened up to the cool pure air of the evening, and, when the hot air of the room has been expelled, the windows can be closed and kept so, at the same time permitting the necessary work therein to be carried out in the light admitted through the windows. During the summer season harm is caused to our cheese by having the shutters of cheese-rooms open whilst work is being done, thereby allowing hot dry air to enter the room.

TRANSIT.

Railway trucks used for the carriage of cheese are unsuitable and cheese becomes overheated in transit to market. I understand, however, the railway authorities have this matter under consideration in relation to their future policy.

IN THE MARKETS.

For export cheese the usual cold storge is provided, which, in efficiency, is quite satisfactory; but warehouses are not all provided with efficient storage wherein to hold cheese waiting local selling.

"BUNCHY TOP" IN BANANAS—INTERSTATE INVESTIGATIONS.

Valuable joint inquiry has already been made by the New South Wales and Queensland Agricultural Departments respecting the occurrence of "bunchy top" in the banana plantations of the Northern Rivers of the Southern State and the Southern areas of Queensland. Some months ago, however, there was some hitch in the arrangement owing to suggestions by the New South Wales Department, one of which had respect to the incidence or extent of the cost of the work; the other bore on the matter of making periodical inspections in the Tweed district by officers other than the two entomologists—Dr. Darnell Smith (New South Wales) and Mr. Henry Tryon (Queensland)—already associated in the work. Queensland had suggested that the entire responsibility for carrying out the investigations should be in the hands of these particular officers.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) said recently that when the New South Wales Director and Under Secretary for Agriculture (Mr. G. Valder) was in Brisbane he had a brief interview with him, and was assured by the visitor that so far as the Southern department was concerned there had not been any hitch in the carrying out of the arrangement for a joint inquiry by Mr. Tryon and Dr. Darnell Smith. Subsequent to that he (Mr. Gillies) suggested that the Under Secretary (Mr. E. G. E. Scriven) should meet the New South Wales Minister (Mr. F. A. Chaffey) and Mr. Valder at the Tweed and discuss the matter further, but the message making that proposal evidently had not been delivered to the Southern authorities until they had commenced their journey south.

To clear the air and pave the way for an acceptable arrangement, Mr. Scriven sent a telegram to Mr. Valder as follows:—"Following your conversation with my Minister (Mr. Gillies), when you said that New South Wales desired to make arrangements to meet this department, I now propose that the two departments should share the expense of the joint inquiry from 1st January last, and that the two entomologists in question should have entire responsibility for carrying out investigation and be free to make their own arrangements. Also that a full report should be presented by them by the end of this year, that is if the investigations are not concluded before then. At the end of the year a revision of the arrangement may be made if necessary."

SUGAR: FIELD REPORTS.

The Director of the Bureau of Sugar Experiment Stations has received the following report, under date 20th July, 1923, from the Southern Field Assistant, Mr. J. C. Murray:—

Yerra.

The cane here is making a fair showing. Farmers have their holdings in good order, and cane is suffering little from noxious weeds or insect parasites. There is a great need for better roads here.

Cane farmers on this area are advised to go in strongly for green manures, and where possible local experiment with a well known standard fertiliser. It is simple and inexpensive to conduct a manurial experiment, and by doing so the farmer will know exactly where he stands when he wants to purchase fertiliser. A chemical analysis is very helpful in this respect, but it is not as conclusive as local experiment.

Cane varieties making a good showing are Striped Singapore, Rappoe, Q.813, Shahjahanpur No. 10, M.1900, N.G.24, and Demerara 1135. These canes are healthy and free from disease. Farmers are recommended to keep M.1900 and Q.813 on the higher loams, and D.1135 and Shahjahanpur No. 10 on the more low-lying areas.

It is probable that material which is the by-product of meatworks should give good fertilising results on soil of this class. Known results with meatworks manures on soils fairly typical of Yerra bear this out. Farmers are advised to be careful in plant selection. Discard any unsatisfactory looking sticks when planting, and destroy any varieties that have proved to be useless commercially.

Mount Bauple.

While the cane here will not cut a heavy crop, farmers are going to have a better harvest than anticipated. There is at present abundant moisture in the soil, the cane is healthy, and any varieties that may remain uncut till the middle of the season should make good growth. Farms in the Bauple districts are well cultivated and kept. Another satisfactory feature for the farmer is the fact that the young plant crop is a success, with a minimum of misses. One farmer has adopted the process of double planting—that is, planting two plants together in the drills, instead of one. The results showed a very small percentage of blank spaces in the field.

Cane varieties making a fair showing at Bauple are D.1135, M.1900, H.Q.285, N.G.22, M.89, Q.822, and E.K.1, also Meerah. With the possible exception of N.G. 22 and M.89, the farmers are very satisfied with the other varieties. H.Q.285 is a variety that will ultimately do well here on a larger scale than at present. This cane, under fair conditions, is a quick grower, and shows, as a rule, a good sugar content as early as July. Unlike many of the other varieties H.Q.285 shows no inclination to bleed if cut early.

In supplying misses to a field care should be taken, if possible, to obtain top plants of a known quick striking variety such as Q.813. This is important, otherwise the supplied plants, in the case of an annual crop, will not be fit to cut when the season comes, and the supplying might as well have been left undone.

Owing to the average chemical fertiliser being dependent for results on fair amount of moisture at the period of application, it is possible that, over a period of years the farmer may get more satisfactory results from dressings of lime, green manures, such as cowpea and green maize, or applications, when planting, of bone meal.

Nambour and Maroochy Districts.

Land improvement and settlement is making rapid progress in these districts. Farmers are extending their existing areas, new settlers are coming in, the company is improving its cane haulage facilities, and the new growing canes are determined to equalise the ups and downs of the sugar market by better farming, and consequently higher tonnages per acre. With this end in view, both on Petrie's Creek and the Maroochy River, the drainage systems are being extended and greater use of lime is being made. New settlers on these ti-tree flat lands are advised not to plant a stick of cane until they have a drain through their farms at least 4 ft. deep. The bottom of the drain at the outlet should be on a level with dead low water, with a watertight gate.

Farmers are cultivating more intensively than hitherto. Green manure crops are more frequently seen than in previous years. A far greater interest is being taken in cane varieties and recognition of disease. Some of the growers are very efficient in this latter respect. An active interest is being taken in the recognition and control of insect parasites.

Numbers of farmers are coming into these areas from the Northern Rivers of New South Wales. They are advised not to bring cane plants from these localities, as there is a danger of transmitting disease.

Cane varieties are in a fairly healthy condition with one exception. This is B.208, a cane introduced by the Colonial Sugar Refining Company to Queensland a number of years ago. It is very susceptible to disease, and is in a very bad condition on the Maroochy River. If this variety were not so susceptible, it would be one of the best canes in Queensland from a commercial point of view.

Canes making a good showing in these districts are Q.813, Gingila, Q.970, N.G.15, D.1135, E.K.1, H.Q.285, M.1900, Rappoe, N.G.40, Striped Singapore, and N.G.16. Of these it is probable that E.K.1, Q.813, and Gingila look the best. The latter cane is making a particularly good showing. There is not a great quantity of it growing, but present results would justify the farmers in extending its acreage. A visit was made to Buderim Mountain in the course of the week spent in the Nambour district. The soil is red volcanic, not unlike Childers, and should grow good crops of M.1900 Seedling. One farmer has in about four acres of this variety, and it is very satisfactory. A deterrent to canegrowing is the lack of loading facilities at the railhead. It would be well worth the farmers' time to seriously consider canegrowing around Buderim Mountain. Just at present the worst roads in Queensland are keeping the district from progressing.

Eumundi and Cooroy.

No new development in canegrowing was noticeable. Distance from rail and the condition of the roads is holding the farmers back. Cane could, however, especially at Eumundi, be profitably grown if the farmers could reach the mill at a reasonable expense.

Cane varieties looking well at Cooroy are H.Q.285, M.189, M.89, and D.1135. At Eumundi H.Q.285 and D.1135 are making an excellent showing.

Bundaberg.

There is a considerable acreage of good land between the city and the Elliott River which might yet be developed for canegrowing. Farmers who have started planting along the Maryborough road are getting on well, the soil being a red forest loam of fair depth and excellent texture. Some growers are using ground limestone and Millaquin mill refuse on their soil with good results.

Canes planted and looking well include M.1900, Q.813, Black Innis, and D.1135. The whole of this country could be irrigated at no very great expense from the Elliott River.

THE FUTURE OF THE SUGAR INDUSTRY.

COMMODITY ACQUIRED—PRICE FIXED—PROCLAMATION ISSUED.

Following the acceptance, under protest, of the Commonwealth Government's sugar policy, and the appointment of a Sugar Board, it became necessary for the Queensland Government to cause a proclamation to be issued under the Sugar Acquisition Act fixing the price payable to the owners of raw sugar at £27 per ton of 94 per cent. net titre for sugar manufactured to the highest practicable standard of dryness, delivered f.o.b. A proclamation fixing this rate, and setting out certain other terms and conditions, has been issued.

The schedule includes the following provisions:—The raw sugar shall be manufactured to the highest practicable standard of dryness. Stocks of raw sugar shall, until delivered, be protected from the weather and air currents to prevent absorption of moisture or other damage. Rules are laid down for the delivery of the raw sugar, and for each millowner from time to time, as fixed by the Treasurer, to give particulars of the quantity of raw sugar manufactured at his mill, and available for delivery. The Treasurer will, from time to time, by notice to deliver, inform each millowner of the quantity of raw sugar which such millowner is required to deliver, and the

place and time at which delivery must be made. A clause is also inserted which provides that the Treasurer or his duly authorised representative may direct any millowner to deliver, at the cost of such millowner, the quantity of raw sugar mentioned in the order, at any mill or refinery or to any person named by him.

It is further provided that if any raw sugar tendered for delivery shall, at the time of tender, contain a greater percentage of water than one-third of the difference between the polarisation of the raw sugar and 100, the Treasurer may either—(i.) Reject the sugar (in which case neither he nor the Government of Queensland shall be under any legal liability whatsoever in respect of such sugar) and such sugar shall revert to or become the property of the millowner; or (ii.) accept delivery of such sugar and deduct from the purchase price of the sugar an amount equal to the amount of probable loss which will result to the Treasurer from the presence of excess water therein after an average time has been allowed for the period between delivery and refining of the sugar.

The certificate by the manager of the refinery at which the raw sugar is refined, setting out the polarisation and net titre of the raw sugar, water percentage, and amount of any probable loss to the Treasurer shall be in evidence on these matters, but the millowner concerned may, within three months after receiving the certificate, appeal against it to an arbitrator to be appointed by the State Chief Justice. The award of the arbitrator shall be regarded as conclusive evidence of the matters stated therein.

In the clause dealing with the payment of the purchase money for the raw sugar delivered and accepted it is provided:—(i.) Whenever delivery of any sugar has been accepted, the Treasurer will, if the millowner so desires, pay to the millowner by whom the sugar was delivered a sum on account not exceeding in any case £21 for each ton of raw sugar delivered; (ii.) after the polarisation, net titre, water contents, and quality of the sugar have been ascertained at the refinery, the Treasurer will pay to the millowner by whom the sugar was delivered the difference (if any) between the amount already paid to the millowner on account of the sugar and the total purchase price therefor, calculated at the rate of £27 per ton of 94 net titre sugar after deducting the amount of probable loss (if any) which will result from the presence of excess water.

Authorised check chemists may enter sugar-mills or the stores of millowners to make analyses and inspections of the sugar.

THE SUGAR SEASON, 1923.

The Director of Sugar Experiment Stations (Mr. H. T. Easterby) has returned to Brisbane after an extended visit to the sugar districts of Bundaberg, Mackay, Cairns, Gordonvale, Babinda, Innisfail, and Lower Burdekin. Following are notes on the tour:—At Bundaberg it was found that the crops had greatly improved since March, due to the favourable falls of rain. In place of the half crop then anticipated, it is now considered that at least a two-thirds crop will be harvested. Some crops of cane are looking particularly well, but a good deal of the cane is still backward compared with what it should be at the time of the year. The cane in the Childers district was reported to be not so far forward as at Bundaberg owing to a smaller rainfall this season.

Conditions at Mackay had been exceptionally severe up to the beginning of June and the cane crops, particularly around the old lands of Pleystowe, Palms, and Racecourse had made poor growth. Grubs were found to be doing more damage than usual in parts of the district. At the Palms Mill only 11 in. of rain had been recorded since the beginning of the year. A large amount of cane for next year had been planted and fortunately, at the commencement of June, good rains fell which were of the greatest service to the young cane and could improve to some extent the standing cane. Before the rains it was estimated that only about a half crop would be cut, and about 32,000 tons of sugar would be manufactured. This, due to the recent rain, was raised to 36,000 tons of sugar for the Mackay district, and may probably be more. Should the remainder of the year be favourable, there should be a crop for next year as the young cane had struck well and was looking particularly vigorous and healthy.

At Cairns the cane generally had made splendid progress, and crops were expected to be well up to the average. Grubs were, however, prevalent in places, more particularly on the Colonial Sugar Refinery Company's plantation at Green Hills where there is still a great amount of old cane stools, trash, and other rubbish which should be cleared away and destroyed, as at present it appears to

be an admirable place for breeding grubs. Experiments at the present time are being carried on with para-dichlorobenzene on Green Hills by the Bureau's Entomologist, Mr. E. Jarvis. There is a marked difference between the treated and check plots. Plots at Meringa show a still greater difference, the green appearance of the cane treated with the chemical being in strong contrast with the yellow appearance of that to which the para-dichlor. had not been applied. It is proposed to carry out further experimentation with this substance.

A disease in cane which was termed "Leaf Scald" was prevalent in parts of the Mulgrave area, particularly in two fields at Aloomba and Mount Sophia. The disease affects the leaf of the cane, in many cases depriving it of chlorophyll so that the leaves are either quite white or only have a few green stripes. The sticks become dwindled and oval. As a rule more disease is found in cane during dry seasons. The utmost care should be taken in planting sound healthy sets and every possible supervision should be exercised. This disease is visible in Badila and H.Q. 426. The Mulgrave Mill are carefully watching the fields in question and are proposing to conduct a survey of the whole district. This disease has been seen for many years past, but up to the present has done little or no damage. It is possible it may disappear if proper precautions are taken to prevent the planting out of sets from diseased fields.

Additions are being made to the Cairns wharves of a most substantial character. A new sugar store is also being erected, so that this important port will be able to store 13,000 tons of sugar. Mechanical loaders are being installed.

Fine crops of cane were seen at Babinda and it is anticipated that the commercial cane sugar content will be above the average this season. A large crop is anticipated and the mill has already commenced crushing. The area continues to be free from serious ravages of pests and diseases. The falling of scrub on new lands destined for canegrowing is taking place, and matters generally appear to be on a fairly successful footing. The rainfall from the beginning of the year till end of June was 88 in.

At Innisfail large crops are expected this season. The cane areas about Goondi and South Johnstone are exceedingly good, and scarcely any damage from grubs was seen. There is also not much disease visible. The Mourilyan Mill are making considerable additions to their plant, including a new carrier using a tipping hopper for truck unloading. A new building is being erected over the crushing plant fitted with an electric gantry. A new 5½-ft. shredder, new 5½-ft. crushing mill, two extra effet pots with 5,000 square feet of heating surface have also been installed. Extensions have been made to the sugar room doubling its capacity. It is intended to put on further improvements next year.

An immense number of tractors are now at work in the Innisfail district on ploughing operations. A large amount of cane has been and is to be planted for next year.

The Lower Burdekin district was next visited. Conditions here had been very trying, it being one of the driest years ever experienced. At Home Hill the new irrigation scheme was now working solidly, and 126 farmers were being supplied with water. Only three wells are now wanted to complete the present scheme. Where early irrigation had been used the cane crops were looking well, but some areas had not received water in time, and the cane was in consequence very backward and in some cases dying. Due to the recent rains there is a very large area already and now being planted for the next year in the Inkerman and Ayr districts, and the land generally has been excellently prepared and is in a fine state of tilth. Good stands of young cane were in evidence everywhere. The variety known as Q.813 was found to be doing well in the Lower Burdekin, one farmer reporting 60 per tons per acre last year with a c.c.s. of 15½ per cent. Tractors are obtaining a great hold in this district also, and many of them are proving a big success in pumping water for irrigation.

Highly successful field days were held at the Bundaberg, Mackay, and South Johnstone Sugar Experiment Stations. There were large attendances of growers in each case, and the proceedings were most interesting and instructive to canegrowers.

SUMMARY.

From Townsville northwards the crops are good to excellent, and the largest portion of this year's crop will be harvested there this year. The tonnages in the Lower Burdekin and Mackay districts will be on the low side, while the yield at Bundaberg should be moderate providing no severe frosts occur. With the exception of Moreton, which has a fine crop this season, the remaining Southern districts will only harvest fair crops. An estimate of the season's output will be published in a few days.

AGRICULTURE IN QUEENSLAND.

PROPOSED LEGISLATION LISTED IN THE GOVERNOR'S SPEECH.

The Speech of His Excellency the Governor (the Right Hon. Sir Matthew Nathan, P.C. (Ire.), G.C.M.G.) at the opening of the First Session of the Twenty-third Queensland Parliament contained the following references to the agricultural position in this State:—

A White North.

"Since the dissolution of the last Parliament I have again visited the North and West of Queensland, and once more satisfied myself that in these parts of the State a white population can live and flourish. At the same time, I realise that they suffer from certain inconveniences and want of amenities not experienced in cooler climates and in more settled parts. The inconveniences due to climate are largely surmountable by improvement in housing and other conditions. But this means, at any rate for the man on the land, higher cost of living in most of Queensland than is entailed in Southern countries for the same standard of comfort, and therefore requires every man's industry to be more remunerative. The cure for lack of amenities is no doubt closer settlement, which brings with it improved roads and other communications, and more agreeable social conditions. With closer settlement, more closely binding communities together, and the industry of individual producers sufficiently rewarded to ensure health and comfort, I have no doubt of the great future of the North and West of Queensland.

The Outlook.

"The Parliament which has just been elected is faced with the task of dealing with many problems of great moment to the people of the State.

"A number of important industries have suffered severely from drought conditiens, and, owing to the unremunerative prices which are ruling for certain products in the world's markets, others are labouring under disabilities.

"Nothwithstanding these difficulties, the outlook for Queensland is by no means discouraging. Queensland's ability to make rapid recovery from seasonal adversity; the expectation of improved market conditions for the products of our industries; the celerity with which new areas of land are being prepared for settlement; and the prospects of the cotton industry: all indicate for the future a condition of profitable industrial and commercial activity for the State.

Resumption of Pastoral Holdings.

"With a view to accelerating closer settlement in the grazing areas of Western Queensland, it is the intention of my advisers to provide for the resumption of some of the pastoral holdings, and their subdivision into grazing farms.

Fodder Conservation.

"The losses suffered by owners of live stock during the recent dry season acutely demonstrates the necessity for a more extensive system of fodder conservation, and the provision of more adequate water supply facilities for settlers in the dry areas. My advisers hope, after consultation with the Council of Agriculture, to submit measures dealing with both of these subjects.

The Sugar Industry.

"The sugar industry has been faced with a very critical position, owing to the tardiness of the Commonwealth Government in declaring its intentions toward the industry on the expiration of the sugar agreement. The proposal eventually put forward by the Commonwealth, although wholly inadequate to stabilise the industry and ensure fair prices to the producers, has had to be accepted, as the only alternative would result in an increased control by the refining interests, uncertainty as to prices and conditions, and difficulty in financing the present crop.

Soldier Settlements.

"One of the undoubted difficulties with which the soldier settlers have to contend is the over-capitalisation of their holdings. In most cases, the improvements on the holdings were effected when costs were unusually high, and as a consequence the improved blocks to-day do not, in many instances, represent a value commensurate with the indebtedness attached to them. It is the intention of my advisers to order a revaluation of the holdings with a view to reducing, where it is necessary, the capital liability of the settlers.

British Empire Exhibition.

"The British Empire Exhibition will be held in England next year. Queensland is participating in this venture in co-operation with the Commonwealth and the other States. My advisers are doing everything possible to ensure that this State's products will be creditably represented at the exhibition."

Among other proposals listed in the Speech and of concern to rural interests are—

- A Bill to deal with the Burnett and Callide Valley lands, which will shortly be opened for selection;
- A Bill to provide a Scheme of Development for the Palmerston area in the vicinity of Innisfail;
- An Amendment of the Main Roads Act to enable the Main Roads Board to undertake the construction of developmental roads in areas about to be settled;
- A Forestry Bill;
- A Scheme to provide better water supply facilities in agricultural districts;
- A Bill to provide encouragement for oil prospecting, and to protect the public from the operations of "wild-cat" companies;
- A Bill to make better provision for co-operative companies;
- A Bill to provide for the adequate control of the cotton industry;
- A Bill to provide a more liberal scheme of financial assistance to settlers;
- A Bill to provide for the conservation of fodder.

POULTRY IN THE NORTH.

The Poultry Inspector, Mr. J. Beard, reports on his Northern tour:—I found the poultry industry in the North still on the increase, and what is the most noticeable the ordinary barn or back yard mongrels are to a great extent giving way to the pure bred birds. The ordinary back yard fanciers, who keep fowls for their own domestic use, are beginning to realise that it is more profitable in every way to run a dozen pedigreed birds, which cost less to feed and show fully double or even greater returns, than two dozen nondescripts in the same time.

While in the Tableland I visited the Atherton and Mareeba Shows and noted the marked improvement in the high quality of the birds exhibited. In almost every class were birds that would be a credit to any show in Southern Queensland.

The poultry at Cairns was a striking feature of the local show. Many new birds came before my notice all of a very high standard. The Tablelanders quite held their own here in any classes in which they competed.

In addition to small holders there are about a dozen fairly large plants established in or near Cairns, and all appear to be working on right lines. Along the way to Innisfail several large plants are established, noticeably at Babinda, Mirriwinni, and Moolala.

Several fair sized plants are worked in and around Innisfail, where the stock during the last two years has been greatly improved by importations from the South, and by using the shedding system of housing during the frequent wet days.

Other towns visited in the far North were Kairi, Yungaburra, Malanda, and Millaa Millaa, on the Beatrice River. The poultry in the four towns are just about holding their own, in spite of the disadvantages of prolonged wet seasons which is detrimental to egg production and favourable to diseases.

At Townsville fanciers are taking a great interest in the industry. New importations are landing by every boat from the South. A number of utility plants are established and are being conducted on satisfactory lines.

Charters Towers is still holding its own in the fancy. Although since my last visit several fanciers have left the field for Southern States, others are filling their places.

Ayr, for the size of the town, possesses many poultrymen. There are upwards of a dozen utility plants all stocked with the right stamp of birds. The locality, consisting of sandy loam country, is ideal for poultry.

Bowen and Proserpine Shows were next visited. Fanciers in these localities are few, and not much encouragement for fostering the industry exists owing to the distances from their market, Townsville, and lack of efficient marketing organising there. I saw eggs marked 4s. per dozen, yet the storekeepers at the same time were only offering 2s. 6d. per dozen, and with maize at 9s., wheat at 10s., and mill offals in proportion, suppliers are worthy of fairer treatment than the margin of retailers' profit indicate.

TO POULTRY KEEPERS.

Notwithstanding repeated warnings by the Queensland Society for the Prevention of Cruelty and public reproaches in the Press, crates of poultry continue to be consigned to market under conditions involving cruelty.

Thoughtful persons, for their own protection and in order to secure the best returns for their consignments, will do well to follow the following recommendations when consigning their poultry to market:—

1. Be sure that your crate is not overcrowded. Use decent crates, lime washed for preference, and have them returned. (Why kill your birds prematurely?)
2. Be sure that there is ample ventilation. (A plain framework crate with wire netting sides and wire netting top is the best. The public buys best what it sees best.)
3. Be sure that all birds have plenty head-room. Fowl and duck crates should be at least 18 in. high, geese and turkey crates at least 30 in. high, pigeon crates at least 9 in. high. All birds in one crate should be as nearly equal in size as possible. (There will be fewer casualties, and they will look better to buyers who are inclined to judge the lot by the small ones. Prime young ducklings trample each other unless divided into small lots.)
4. Be sure that there are no gaps between the flooring boards of the crate where birds may get their feet crushed or their legs broken. (Damaged goods are bad sellers.)
5. Be sure you cover the bottom of the crate with straw. (It keeps the birds clean and adds to their appearance, and condition sells the birds.)
6. Be sure that water is available in the crate. (A loose tin is worse than useless. Fix syrup tins at opposite corners of the crate and see that they are filled with clean water before trucking. Your agent can also fill them easily on arrival.)
7. Be sure that your birds are well fed with grain before despatching. (A drooping, thirsty, or starving bird is a bad seller.)
8. Be sure that while waiting for consignment your birds are not left exposed to rain, wind, or sun. (You can't depend on the porter.)
9. Be sure you send a post card to the person to whom you are consigning birds, so that he knows when to expect them.
10. Be sure that you do not carry or consign any birds tied together by the legs. (We'll give you no second chance.)
11. Be sure that you do not get prosecuted for cruelty by neglecting to follow the foregoing advice. (We have inspectors at the markets every day, and any cases of bagging, cramping, overcrowding, rough handling, or other cruelty to poultry are thoroughly investigated. Court cases are costly in time, money, and reputations.)

FORTHCOMING SHOWS.

Sandgate: 3rd and 4th August.
Brisbane Royal National: 6th to 11th August.
Belmont: 18th August.
Coorparoo: 25th August.
Gympie: 29th and 30th August.
Wynnum: 31st August and 1st September.
Imbil: 5th and 6th September.
Zillmere: 8th September.
Laidley: 13th and 14th September.
Stephens: 15th September.
Beenleigh: 20th and 21st September.
Ingham: 21st and 22nd September.
Rocklea: 22nd September.
Dakabin: 22nd September.
Toombul: 28th and 29th September.
Kenilworth: 4th October.
Esk Bushman's Carnival: 17th and 18th October.
Nerang: 19th October
Ascot: 24th October.
Malanda: 24th and 25th October.
Pomona: 21st and 22nd November.
Millaa Millaa: 23rd and 24th November.

THE ORANGE TREE BUG.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has received the following report from the Government Entomologist, Mr. Henry Tryon, on the Orange Tree Bug reported as especially prevalent in the Blackall Range district:—

One of the points that had to be cleared up related to the question—Whence came the individual insects that appeared in spring (September), they being apparently absent during the winter months? This was especially raised by Mr. H. Morris, of Flaxton, probably the most patient observer of the insect in the Blackall Range area.

Now in my January investigations I was fortunate in discovering a peculiar phase in the life-history of the Orange Tree Bug that had been previously overlooked by those concerned. This phase was entered upon on a casting of the skin, when the insect was about five days old. In this it measures 7 mm. long (about $3\frac{1}{2}$ lines) is perfectly flat, almost as thin as paper, and is coloured so very like to the green of the underleaf surface as to be practically invisible; and, moreover, unlike, in this respect to the insect of the first stage growth, clings to the foliage with some tenacity on being disturbed. In the occurrence of this appeared to reside the probable explanation the virtual absence of the insect during the winter months.

Accordingly, when I deputed Mr. A. A. Girault, Assistant Entomologist, to resume the inquiry at the point to which it had been conducted, he was instructed "To concentrate his attention on the method in which the insect overwinters, and when, and where this takes place, with a view to the discovery of a possible efficacious seasonal method of dealing with it; my discovery of a special—previously overlooked—phase in its life-history being suggestive in this regard.

Mr. Girault, on his return from his visit to the Blackall on 6th July, has reported that my tentative conclusion actually accords with fact.

That these (the Orange Bugs) are present in this second larval (or nymphal) stage of growth during the winter period, and that although the greatest difficulty attends the discovery when they occur, of even an individual or two, still they may be caused to fall to the ground in numbers on the trees being beaten (jarred) and so reveal their presence. Moreover, he has noted the remarkable fact that every insect that has been thus laid low, and fell how it will, makes invariably but slowly for the trunk of the tree from whence it has been precipitated, and on reaching this commences to climb up it and so repairs to its old quarters.

It thus happens that the bug, when once established in an orangery breeds continuously therein, and that accordingly, the winter months, after the crop is off, give the opportunity for dealing with it, and so preventing a spring brood of adults appearing on the scene. Also that unvisited orangeries are threatened by a visit of the pest from one in which already the insect is established, and that therefore its subjugaction is a matter of common concern.

How best to destroy it then, and under the circumstances mentioned, is still a matter for experiment, a feature in the work that this office will not overlook. At present banging the trees, in order to dislodge the young insects, so that they may fall on to bare earth to be collected say by poultry at hand, will involve in most cases throwing down the crop, at least in part; but there are other measures, one consisting possibly in the use of smoke for example, that may be found to accomplish the desired result.

It is proposed that the Assistant Entomologist's interesting report will be published and made generally available in the near future.

QUEENSLAND TREES.

BY C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

No. 23.

THE CORDUROY TAMARIND.

This tree, which is known botanically as *Nephelium Lautererianum*, is a very ornamental species, as it forms a dense head of very pretty fern-like foliage. Like several other species of the natural order Sapindaceæ, when the bark is removed the surface of the sapwood is seen to be strongly wrinkled lenghtwise. From this peculiarity is derived the name "Corduroy" on account of the resemblance of the wrinkled surface of the sapwood to corduroy cloth. The timber is brown in colour, prettily grained and fairly heavy. Under the recommendation of the Forestry Department it is being used as a substitute for maple. The seeds are enveloped in a yellow pulp of a sharply acid flavour similar to that of the Native Tamarind. The trees are found in the rain forests of the North Coast Line, from Beerwah to Maryborough, on Fraser Island, and in the Eungella Range, westward of Mackay. They attain a height of about 80 ft., and a barrel diameter of 1 ft. 8 in.

Photo by the Authors.]

PLATE 13.—CORDUROY TAMARIND (*Nephetium Lautererianum*).
A Tree in the Ranges eastward of Traveston, North Coast Line.

Photo. by Dept. Agriculture and Stock.]

PLATE 14.—CORDUROY TAMARIND.
Showing Twig with two Dried Fruit Separate.

A THIN-SHELLED VARIETY OF THE QUEENSLAND NUT (*MACADAMIA TERNIFOLIA*).

BY C. T. WHITE, Government Botanist.

It is unquestionably granted on all sides that one of the finest flavoured nuts in cultivation is the Queensland Nut or Bush Nut (*Macadamia ternifolia*). It is a nut particularly suitable for high class confectionery, but a great objection to its use on a very large commercial scale has been the very hard thick shell (putamen) in which the kernel is enclosed.

The nut has attracted some attention outside Australia, thus E. André, the well-known French horticulturist, writing the the "Revue Horticole,"* says—"The ripe fruit, however, is more particularly interesting. Usually one of the ovules is abortive, and the surviving one fills the whole of the interior of the shell with its white, firm, close-grained albumen, forming a kernel which is as crisp as that of the hazel nut, but has a higher aroma and a finer flavour. We have gathered and eaten these nuts in the month of December. *Macadamia ternifolia* is a tree which should be cultivated, both from an ornamental and economic point of view. Even if it yielded no fruit; it would make a fine appearance in gardens in the South of France, where the specimens already planted have passed uninjured through winters as severe as that of 1890-91, but how greatly enhanced would be the interest and importance attaching to these species if we could look forward to the discovery of some feasible mode of inducing the trees to yield a regular supply of their pleasantly flavoured nuts."

E. Popenoe, writing on the "Tropical and Subtropical Fruits of California,"† says—"The drought-resisting qualities of this tree make it of value for semi-arid regions, while its ornamental appearance commends it for culture in every garden. While very few trees are yet in bearing in the State, several thousand young plants have been disseminated by the nurserymen within the last few years, and the tree promises to become popular, not only for the home garden or orchard, but commercially as well."

The tree is a native of Southern Queensland and Northern New South Wales, being quite plentiful in many of the coastal scrubs (rain-forests). It is found in heavy rain-forest country such as the Northern Rivers (N.S.W.), Tallebudgera (Q.), &c., and drier scrubs such as Mount Bopple (Q.), &c. It is to be noted that the tree is spoken of in America as one being particularly drought-resistant; and it is interesting to note that in its natural habitat the species finds its greatest development on the one hand in heavy rain-forest country such as that on the Tweed River with an average rainfall of 70 in., and on the other hand in drier "scrubs" (rain-forests) to the north and west of Gympie with an annual rainfall of approximately 45 in. These instances go to show that the tree can be grown under a variety of conditions.

Mr. J. B. Waldron, of Upper Eungella, Tweed River, New South Wales, has for some years past given a good deal of attention to the Queensland Nut, and has among a large collection of varieties or forms growing on his place a particularly thin-shelled one which should have considerable possibilities as a commercial nut. The shell measures in parts only 1 mm. (½ line) in thickness, and in addition to being thin, usually cracks along one side of the sature so that a penknife can be inserted and the shell opened and the kernel extracted with great ease. The Department has secured from Mr. Waldron a number of seeds of his thin-shelled variety, and it is intended to raise a number of plants to see if the variety will come true to seed, and to keep on improving it by selection so that eventually a race of large thin-shelled nuts may be produced. It is further intended to try other methods of propagation in an attempt to perpetuate the variety in case seedlings should not come true.

The photographic illustrations show: (*a*) The leaves and fruit of the thin-shelled nut, and (2) Two trees of the variety growing on Mr. Waldron's farm.

* Translation from Maiden's Forest Flora of N.S.W., Vol. 1, page 218.

† Journal of the Royal Horticultural Society, England, Vol. XXXIX., p. 336.

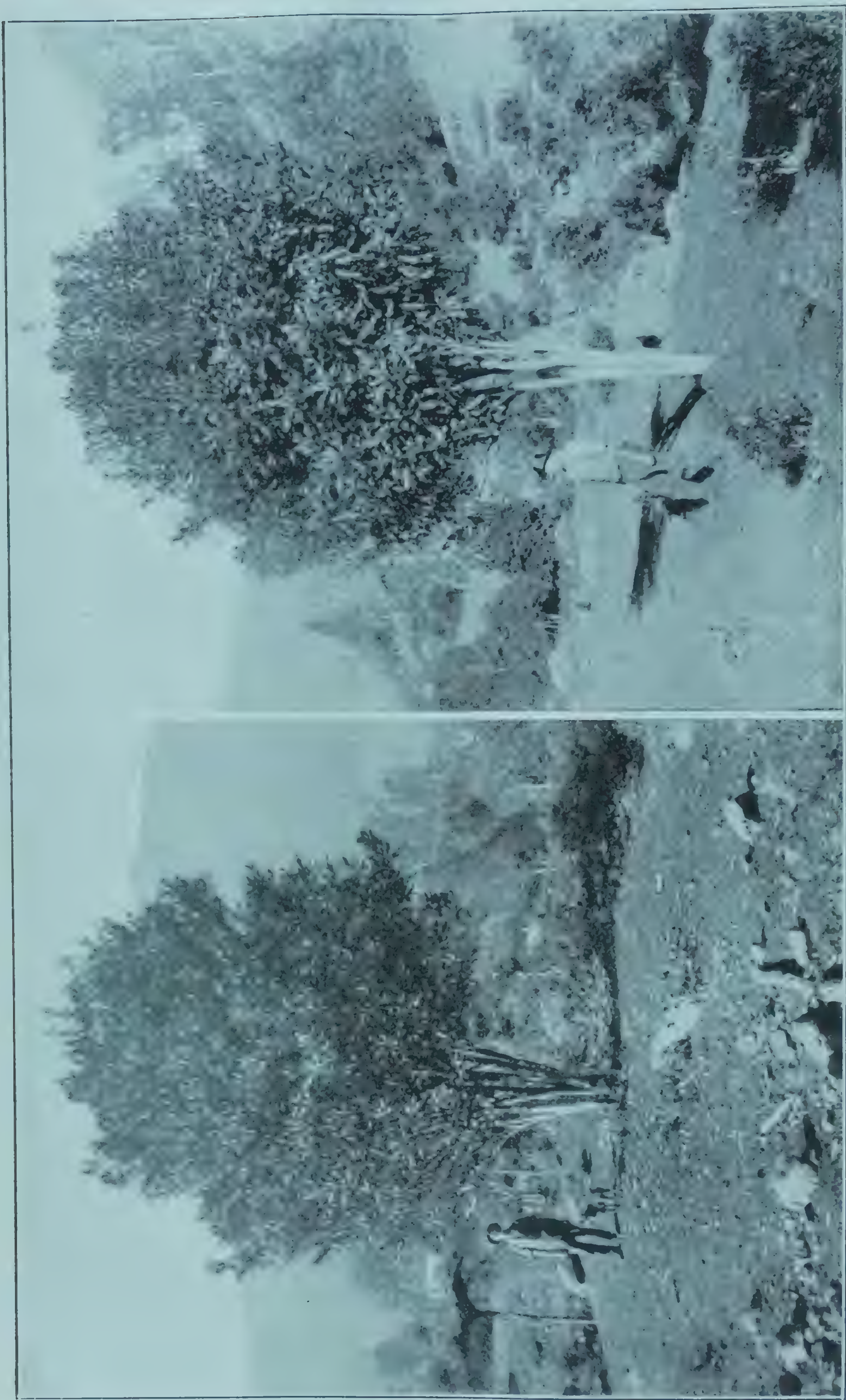


PLATE 15.—QUEENSLAND NUTS (MACADAMIA) TREES, UPPER EUNGELLA TWEED RIVER, N.S. WALES.
Left: Parent tree, thin-shelled variety. Right Seedling from parent tree, 12 years old.

PLATE 16.—QUEENSLAND NUT (*Macadamia ternifolia*), THIN-SHELLED VARIETY.
The line at base represents 1 inch.

MARKETING QUEENSLAND FRUIT.

COUNCIL OF AGRICULTURE CONFERENCE—ORCHARDISTS ADOPT REORGANISATION SCHEME—PROVISIONAL COMMITTEE OF DIRECTION APPOINTED.

No Industry calls more insistently for better Marketing of Products than the Fruitgrowing Industry.

The future of the Industry depends on efficient and effective reorganisation.—*Hon. W. N. Gillies.*

An important Fruitgrowers' Conference, attended by over 100 delegates from local producers' associations in the fruitgrowing regions of the State, assembled in Brisbane on 19th July. The business of the gathering was to consider concrete proposals for the reorganisation of the fruitgrowing industry, as recommended by a special committee of the Council of Agriculture. The Chairman of the Fruit Standing Committee (Mr. W. Ranger, B.Sc., Stanthorpe) presided, and with him on the platform were the Director of Fruit Culture (Mr. A. H. Benson, M.R.A.C.), the State Trade Commissioner (Mr. W. H. Austin), the Director of the Queensland Producers' Association (Mr. L. R. Macgregor), and members of the Council of Agriculture.

The proceedings were opened by the Minister for Agriculture and Stock (Hon. W. N. Gillies) who, in the course of a vigorous address, said that the conference was one of the most important gatherings of fruitgrowers in the history of the State. He hoped that the delegates would concentrate their attention on the real essentials for which the conference had been called. The questions to be considered were so important that they might be regarded as of national concern. No industry called for better marketing of crops than did the fruitgrowing industry. The only chance for the industry to make advancement lay in reorganisation. That was the reason the Council of Agriculture had been brought into being. This conference was the result of the work of that council, and he asked them to recognise the amount of work that the fruit committee of the council had performed in connection with the present scheme. He hoped they would give very careful consideration to the proposals. They could modify them if they thought it necessary, but before they dispersed let them do something that would prove of benefit to the industry. They should not allow anonymous correspondents to draw "red herrings" across their track unless they had something better to put before the fruitgrowers. The Press of Queensland on a previous occasion had been able to sink political differences in the battle for fair treatment of the sugar industry. He hoped the Press would do the same thing for the fruit industry, and if it did it would be doing something of great service to the fruitgrowers. (Loud applause.)

The Director of the Queensland Producers' Association (Mr. L. R. Macgregor), in the course of a lucid exposition, outlined the proposals recommended by the special committee. He also spoke strongly of the difficulties against which fruitgrowers had to contend, and pointed out their duty to place their product on the market in an attractive condition.

THE PROPOSALS.

The concrete proposals submitted to the conference for consideration were:—

1. That an Act of Parliament be asked for covering the reorganisation of the fruit marketing.

2. That an endeavour be made to use local organisations and corporations already in existence and existing agencies of distribution as far as practicable.

3. That provision be made by such Act for legal constitution of local fruitgrowers' marketing associations operating at present without due incorporation, either on a non-capital non-profit basis or on a basis of capital as may be desired.

4. That local organisations be allowed to trade in fertilisers, fruit cases, and other growers' requisites by consent of the central organisation, but the activities of the central organisation shall be confined to the marketing of fruit.

5. That each local organisation be a member of the central organisation to control marketing in Brisbane, Sydney, Melbourne, Adelaide, and elsewhere.

6. That the Central Growers' Organisation be controlled by a Committee of Direction elected annually by members of the local organisations, and one member nominated by the Council of Agriculture. The Committee of Direction shall not exceed ten in number, and shall be comprised as follows:—Banana growers, 2; pineapples, 2; citrus, 2; deciduous, 2; small fruits, 1; and a nominee from the Council of Agriculture. The Committee of Direction shall control matters of general policy, but may devolve certain powers upon an executive of three, to be elected from among their own number.

7. (*a*) That the growers' representatives on the Committee of Direction shall be elected by growers on a sectional basis; and (*b*) that the members of the Committee of Direction shall retire annually, but shall be eligible for re-election.

8. The central organisation shall be a non-profit, non-capital organisation.

9. That the proposed Act shall vest in the Committee of Direction control of the marketing of all Queensland fruit as from a date to be fixed. Fruit to be allowed at the outset to filter through to existing channels as at present, control gradually to be exercised as bringing to fruition of a policy of extension of markets justifies this, or as an approaching glut season renders this urgently desirable.

10. That it is desirable to allow the Committee of Direction to formulate and carry out its policy, but as indicative of what could be accomplished under the method of control recommended, suggestions are set out in clauses following, and that power should be provided in the Act for the committee to carry out the suggestions set out hereunder:—

(i.) A vigorous policy to be pursued to attain the objective of ensuring that all fruit transmitted to market will pass through either community packing sheds, or, alternatively, a form of inspection in cases in which the application of the packing shed principle is impracticable or undesirable.

(ii.) Arrangements governing loaders to be extended to the fullest degree under control of central organisation, and all fruit to be consigned in bulk where possible.

(iii.) Provision for institution of packing sheds on requisition of the growers concerned, and this under conditions to be arranged by the Committee of Direction.

(iv.) Fruit to be marketed under the grower's or community brand, and at the outset growers to be invited to nominate those agents by whom they desire their fruit to be handled, and, in order that as little disturbance as possible may result, an endeavour to be made by the Committee of Direction to the effect that fruit which has been marketed by growers for years through one agent shall still go through that agent.

(v.) Agreements embodying guarantees to be entered into by Committee of Direction with the agents. The committee to maintain constructive and to seek to eliminate destructive and inimical competition, and to limit the number of agents, if desirable.

(vi.) The Committee of Direction should appoint a receiving representative in each market who would be placed in a position to compare the results, and gradually endeavour to bring about stabilisation.

(vii.) Agency or other representation should be established in the large towns in Queensland, such as Gympie, Maryborough, Rockhampton, Bundaberg, Mackay, Cairns, Mount Morgan, Toowoomba, Roma, and Goondiwindi, as well as in such places outside the State, as Newcastle, if necessary.

(viii.) Consideration should be given to the running of a special fruit train on country railways, either by affording existing distributors a limited time in which to build up such a trade subject to the Committee of Direction stepping in if it be not sufficiently quickly developed, or, alternatively, a straight-out arrangement under which such fruit trains would from the inception be accompanied by a representative of the Committee of Direction to deal with the sale of fruit at places other than those mentioned in the preceding clause.

(ix.) Consideration should be given to instituting negotiations with the Commissioner for Railways with a view to railway station-masters acting as agents on a small commission basis.

(x.) Consideration should be given to the fixation of two prices, wholesale to the retailer, and a retail price to the private buyers, encouragement to be given to country fruiterers and storekeepers who sell fruit and who should be recognised as being a good asset to the industry.

(xi.) All distribution should be effected as far as possible through trade channels, either established or to be established.

(xii.) Encouragement should be given to the establishment of co-operative retail shops by bodies of a growers' society, but not under the Committee of Direction, in which connection the following observations are offered:—

(*a*) Buying in open market gives first-hand knowledge of wholesale trade and leads to effective control.

(*b*) Purchasing on a large scale would stabilise market, as the shops would be run in growers' interests, fair prices would always be paid, and extra efforts to sell retail would be made in times of over supply (*e.g.*, fruit carts).

(*c*) By selling honestly the public would be encouraged to continue and extend their buying.

(*d*) The primary object being to give a reasonable return to the grower, the consumer would be encouraged by being charged reasonable prices.

(*e*) Inferior fruit (*i.e.*, below reasonable standard) would not be sold.

(*f*) Buying for the shops could be combined with buying for country establishments. The bigger the connection secured the more could the market be dominated until it might be possible to assume entire control.

(*g*) This method of attack could be developed gradually and systematically. The wholesale trade demands extended credit, and an accurate summing up of buyers' stability. The vested wholesale interests are firmly entrenched, and would jealously guard themselves. Retailers generally have interests other than fruit, and are not closely banded together. Fresh territory could be explored and, if thought advisable, competition need not be entered into where a district was adequately served. Fruit products (pure fruit drinks, fruit sweetmeats, canned and dried fruits, &c.), could be handled as well as fresh fruits.

(*h*) No heavy finance is required. Money is turned over quickly, and each establishment would be self-supporting probably from the start.

(*i*) There is no possibility of serious loss. The risk is spread very widely, and the exact position of each establishment known weekly. A big number of shops would not be opened simultaneously. The ground captured at each advance would be consolidated before a fresh offensive was undertaken.

(*j*) Ample precedent is available in the big success of the multiple shop establishments in England (*e.g.*, Lipton's grocery), Maypole Dairy Company (butter, margarine, and tea), Hunter's (tea, sugar, and condensed milk), Public Benefit Company (boots and shoes), Mansfield (boots and shoes), Home and Colonial (tea, sugar, and condensed milk).

(*k*) If establishments were opened at such centres as Toowoomba, Ipswich, Rockhampton, and Mackay, the representatives there could probably also act as "receiving agents," thus minimising the expenses.

(xiii.) Marketing both in the sphere of the local and central organisations should be conducted on a non-profit basis, growers securing full benefit of freight concessions, and any other savings. Expenses, including advertising, to develop markets, if, and when desirable, should be met by deductions from account sales, either on a case or bunch basis, or on a basis of percentage of values or such other method as may be determined by the Committee of Direction.

(xiv.) Request should be made for Government guarantee to enable financing of proposals herein.

Note.—Financing under the scheme set out herein does not involve trading risk. Trading by Committee of Direction is not advocated. *Del credere* would be carried out by existing distributors whom it is not proposed to eliminate. The finance therefore embraces only inital establishment until funds are available. The temporary overdraft at the bank would not exceed £——, and for this only would Government guarantee be sought.

(xv.) Steps should be taken to obtain legislation for the standardisation of fruit agents' accountancy and bookkeeping methods, which would show, among other items, the buyers' names and addresses.

Note.—If by reason of any of the foregoing clauses difficulties should arise with existing fruitgrowers' organisations having a similar or allied object, every effort shall be made to have these difficulties amicably adjusted.

11. Provision should be made for the scheme to be operative for a term of three years, and to continue thereafter unless on requisition of 500 growers a ballot be demanded, and a majority of registered growers demand discontinuance.''

Support for the Scheme. Solidarity an Essential Feature.

The chairman read a minute which the Director of Fruit Culture had forwarded to the Minister, in which he stated that he was thoroughly in accord with the scheme. He urged that the scheme must be carried out by all growers, as their solidarity was an essential feature.

The banana growers of the Tweed and Richmond River districts forwarded a message congratulating the Queensland fruitgrowers on their attempt to deal with marketing problems, and stating that they had carried a motion advocating if the scheme were adopted, that the banana growers of New South Wales should be brought in line with such scheme.

A number of questions relating to the proposals were asked of Mr. Macgregor by the delegates, and satisfactorily answered.

Proposals Considered.

The meeting dealt with several of the special committee's proposals, the adoption of which was moved by Mr. Macgregor.

On proposal 1, Mr. A. A. Baker moved an amendment setting out that an Act of Parliament should be passed ''embracing a system of co-operative marketing of fruit and vegetables.''

Mr. Macgregor pointed out that the conference was one of fruitgrowers alone, and he suggested that the additional words should be added to the proposal, setting out that the Governor in Council might extend the provisions of the Act to vegetables. Mr. Baker accepted the suggestion, and withdrew his amendment. Subsequently effect was given to Mr. Macgregor's suggestion.

Another delegate submitted an amendment providing for a plebiscite of the growers in respect to No. 1 proposal, but it was defeated by an overwhelming majority.

The clause was carried without amendment.

Proposals 2, 3, and 4 were agreed to practically without discussion.

Proposals 5, 6, and 7 were considered together. The conference, by a big majority, decided that the method of the election of the Committee of Direction should not be by direct ballot on the part of he growers, but through the sectional groups of fruitgrowers.

An attempt in respect to proposal 6, to reduce the number of the members of the committee to 9, and to give the banana growers three representatives, pineapple growers two, citrus growers one, deciduous growers one, and growers of other fruits one, was defeated. It was resolved, however, to alter ''small'' fruits to ''other'' fruits.

On the motion of Mr. Macgregor it was resolved that the first committee should be provisional, and should hold office for six months after the passing of the Act.

A diversity of opinion existed concerning the method of the appointment of this provisional committee. After considerable discussion, Mr. Macgregor moved that the conference should assemble at 9 o'clock on the following morning, when those interested in the different sections of the industry should select four members from each of the principal groups, and from these the Council of Agriculture should make a selection as provided for in proposal 6.

The motion was carried by a substantial majority.

SECOND DAY'S SESSION.

The Pooling Question.

The conference was continued on Friday, when clause 9 of the proposals, which proposes to vest in the Committee of Direction the control of marketing of all Queensland fruit, came up Mr. Andrews (Samford) moved as an amendment "That the committee have no power to form pools."

Mr. Gower seconded the amendment.

Mr. Edwards (Cooroy) said he believed that pools were frequently necessary.

Mr. Macgregor suggested that the position might be met by inserting a provision that growers' fruit shall secure its own price and not be pooled with inferior products, except in case of a condition of emergency threatening the whole industry.

Grades and Prices.

Mr. Andrews: My association contends that there are preferential grades, and in pooling all grades bring the same price. This removes the incentive to produce first-class fruit. It encourages a levelling down process that is injurious to the industry.

Mr. Macgregor: That principle is wrong. Grading protects the industry. Lemons can be bought by cable quotations from Italy on the grade system with absolute safety. We want to bring about a similar position with the fruits of Queensland. To adopt any other policy would be fatal. Certain definite grades and brands should be established and encouraged. Differentiation between grades would be highly inimical to the whole industry.

Mr. Skaner (Eumundi) supported the amendment. He said that several attempts had been made to "ring in" this clause. It gave power to form pools, and that was opposed to the growers' interests.

Mr. Baker (Thulimbah) said he considered the clause was vital to all they had discussed. If it were dropped their efforts for organised marketing would have been useless.

Mr. Nicklin (Palmwoods): Unless something is done to ensure a market for winter pines we will be in a serious position. It is highly necessary to have a unified marketing organisation.

A Delegate: When I consign my fruit I never know where it is going to. My experience is that it always finds its way into a pool, private or otherwise. It may be consigned to a certain person, but there is no guarantee that it is not going to some agent who is trying to create a corner. In view of this it seems idle to me to deny the association the opportunity of conserving the growers' interests.

Constitution of the S.Q.F.S.—Alteration Proposed.

Mr. Ross (Summit) said he believed pineapple growers were "on a good wicket." There had been a lot in the Press about rotting crops. The Trade Commissioner should have grappled with that. Could it not have been arranged that the State canneries should deal with abnormal situations, such as the one complained of? Pineapples were selling at 6d. a dozen on the field. The consumer was paying 9d. each for them. Somebody was doing pretty well out of it.

Mr. Andrews contended that if new markets were opened up there would be no gluts.

The amendment was defeated by a large majority, and clause 9 was passed as drafted.

Clause 10, subclause (i.), "packing," was agreed to. Subclause (ii.), "loaders," and (iii.), "local packing," were agreed to. It was then decided that subclauses (iv.) to (xv.) should be agreed to, with unimportant modifications, as drafted, except in clause (v.), which was amended by consent to provide that agreements could be entered into with canners as well as agents where guarantees were concerned.

Desultory debates on various irrelevant matters occupied a lot of time, until the chairman applied the closure.

Mr. Macgregor moved that it should be a recommendation to the shareholders of the S.Q.F.S. to alter its constitution, eliminating individual shareholders, and providing that shareholders should be local associations, and that this should be set

out in the Act and that the society should agree to the power being set up in the proposed Act to enable the transposition to be effectively carried out. He pointed out that this would be an essential to the effective carrying out of the proposed co-operative retailing scheme. The motion was seconded and carried.

Co-operation with the Government.

It was decided that the association should co-operate with the Government in the proposed legislation, and that there should be an annual conference of growers.

The subjects discussed and passed at the first session were then recommitted for final consideration in their amended form.

The clauses of the scheme were agreed to without amendment, and the proposal passed all stages.

Committee of Direction Elected.

Elections for the Provincial Committee of Direction resulted as follows:—

Banana section: W. B. Cathcart (Landsborough), C. Christie (Currumbin).

Pineapple: H. Vinicombe (Glasshouse), J. J. Thomas (Montville).

Citrus: T. H. Brown (Montville), L. G. Swain (Flaxton).

Deciduous: J. S. Mehan (Stanthorpe), D. Ferunda (Stanthorpe).

Other fruits: H. Archibald (Stanthorpe).

The newly elected members returned thanks, and the conference concluded.

REPORTED OCCURRENCE OF BOLL WEEVIL IN THE NORTHERN TERRITORY.

The Minister for Agriculture (Hon. W. N. Gillies) mentioned recently that in view of the statement to the effect that the boll weevil (*Anthonomus grandis*) had been reported in the Brisbane Press of Tuesday, 24th July, as being present in the cotton fields of the Northern Territory, and that alleged report is erroneous and misleading, an inquiry into its origin connects this with a recent report by the Government Entomologist (Mr. Henry Tryon), from which it appears certain that the designation accorded the insect should have been boll worm (*Platyedra gossypiella*) and not the one assigned to it. This distinction is very material since one insect is a genuine weevil attacking the flower-buds of the cotton with great perniciousness, and the other a small moth attacking in its caterpillar phase of life the seed-capsules or bolls of this plant, and that may be locally very pernicious or not—as the experience of cotton-growers in India indicates. They differ again with respect to their geographical range of distribution, the boll worm named being almost cosmopolitan in its occurrence within the limits of cotton growth as a field crop, and already known to have existed in Australia; the boll weevil, on its part, being limited to the New World.

Mr. Tryon's report sets forth that on the 26th June there was found a living Platyedra caterpillar, and characteristically damaged seed—the work of the same insect, in a consignment that had just been sent from the Northern Territory to Brisbane to be ginned, and that it was an evidently very rare occurrence in this consignment; also that this cotton, on his advice, had been exported. Further, that on the 19th July a very small package of what was described as "some diseased specimens of cotton bolls" had been forwarded in a sealed tin box by the Commonwealth Superintendent of Agriculture (Mr. C. E. T. Allen) and that amongst the insects that constituted the "disease" were two moths of the boll worm named, and the two empty cocoons from which they had emerged. Mr. Tryon further added that in view of the probability of the occurrence of this pest in cotton on its arrival at any ginnery, he had urged some time since the installation of a Simon's heat generator appliance at the various ginneries for treating seed as it issued from the gins, so as to destroy any insects present, and that he now recommended the isolation of the Northern Territory with respect to cotton so far as the remainder of Australia was concerned.

What the significance of this discovery may be to the Northern Territory as a cotton-producing State cannot be confidently anticipated; but of our obligation to confine it there, or better, if practicable, to secure its extermination, one cannot but entertain a positive opinion; and no doubt, after full inquiry as to the facts of the insect's occurrence there, steps will be taken to do this and do it speedily.

IRRIGATION IN QUEENSLAND—II.

By H. E. A. EKLUND, late Hydraulic Engineer, Queensland Water Supply Department.

Subjoined is continuation of a comprehensive survey of irrigation possibilities in Queensland. Mr. Eklund was formerly in the State Service as an Hydraulic Engineer and as Executive Engineer in charge of the Inkerman Irrigation Works in North Queensland, and is now engaged on an important water supply project in South Australia. The widespread interest now centred upon land settlement in Queensland, and the general practical development of the forward Government policy in relation to agricultural extension and the enrichment of rural life in this State, makes the publication of Mr. Eklund's observations particularly timely. The review will be continued through succeeding issues of the Journal.—Ed.

IRRIGATION ON THE LOWER BURDEKIN.

"The earth is here so kind, that just tickle her with a hoe and she laughs with a harvest."

The system of irrigation here employed is based on the fact that adequate supplies of water can be obtained at shallow depths. The geological formation of the area is that known as a "delta," and the water occurs in a coarse drift usually met with at from 10 to 40 ft. below the surface. The easiest and quickest way of obtaining this water is by employment of the spear-tube or gang-well system, for many years practised in certain localities in America. The actual spear point is the Abyssinian spear modified, and consists of an octagonal cast-steel cone screwed into

PLATE 17.—AN EIGHT-INCH PUMPING PLANT ON AN OPEN WELL, 56FT. DEEP, LOWER BURDEKIN.

the pipe to be driven. This pipe (usually 2 in.) for the first 2 or 3 ft. from the cone is drilled with $\frac{3}{8}$-in. or $\frac{7}{16}$-in. holes, closely placed and covered with fine copper or brass gauze (200 mesh) soldered to the pipe. Copper or brass wire is then sometimes wound round the gauze and a further cover of perforated zinc or brass sheet secured to this, so making a very efficient screen. The cone at the bottom being larger at the shoulder than the pipe gives a clearance as shown in fig. 1, so saving the covering from being torn off the tube in driving, and the coupling above acts as a protection when the pipe is being withdrawn. In cases where very fine sand is met with even the screen on a spear or well-point becomes choked, and one method of overcoming this trouble is described by Myron L. Fuller, an American authority, in W. S. Papers 225.

Assuming that a 2-in. spear is to be inserted into the troublesome strata, the hole is commenced of a diameter sufficiently large to permit a 4-in. tube to reach the fine water-bearing sand. A supply of pebbles is then dropped down the well and the well-point worked into this. In many cases this method has been found efficacious in dealing with troublesome quicksands. The driving is done by means of shear legs and a hardwood "monkey" after a $2\frac{1}{2}$-in. or 3-in. hole has been bored with an ordinary earth auger as deep as practicable. Any number of these tubes may be driven, and after it has been ascertained that they are in the water-bearing stratum they are coupled up to a common suction main connected with a centrifugal pump. In cases

Plate 18.—A Pumping Plant drawing from Open Water, Lower Burdekin.

where the water has to be lifted more than 16 ft. to the surface, the tubes are driven in the bottom of trenches and the pump put in a pit sufficiently deep to render the lift practicable. As it is necessary to get the least suction lift possible, a low-lying portion of the land is usually chosen for the spear battery. This necessitates lifting the water to a flume sufficiently high to deliver the water by gravitation at the point from which it is distributed to the irrigation channels. It will often appear, in view of the extra lift and long flume thus necessitated, that the sinking of a well at the right spot would have been cheaper in the long run. There are two reasons why this is not generally done: Firstly, water may be unobtainable just where required for distribution; and secondly, sinking wells in the loose drift requires expert labour and special appliances not always obtainable. Some attempts at well-sinking proved so troublesome that further endeavours in this direction have been completely abandoned by the farmers. In one or two cases where wells reached water, trouble was also experienced with the sand rising inside the lining of the well as soon as pumping commenced.

A drawback to the spear battery is the greater power needed for a certain amount of water obtained. Another very annoying experience is to find that the

suction is leaky, and owing to the great number of joints it is often difficult to find the leak. Where the connections are laid in trenches it is often a long job to put a spear plant in order, and all things considered a well, even if great in first cost as compared with the spears, would certainly be more efficient and satisfactory. The writer succeeded in obtaining a good supply—750 to 1,000 gallons per minute, or 2 to 3.6 cusecs—from each of four new wells sunk on the southern side of the Burdekin put down in order to test the supply for a proposed irrigation scheme. Only 9 ft. of water was obtained in each, but for permanency and safety not less than 15 ft. is desirable.

The method of applying water to the crop in the Burdekin district, where sugar-cane is the principal product, is almost invariably the furrow system, the water being applied between the rows of the cane. It is to be regretted that the only measure of water used is that obtained by noting the time of pumping, and this but roughly. There do not appear to be any precautions taken to ensure constancy of speed, and it is very doubtful if any of the pumps employed have ever been properly rated; the makers' rating being generally accepted without any attempt at corrections to suit the exact ''head'' or height of lift.

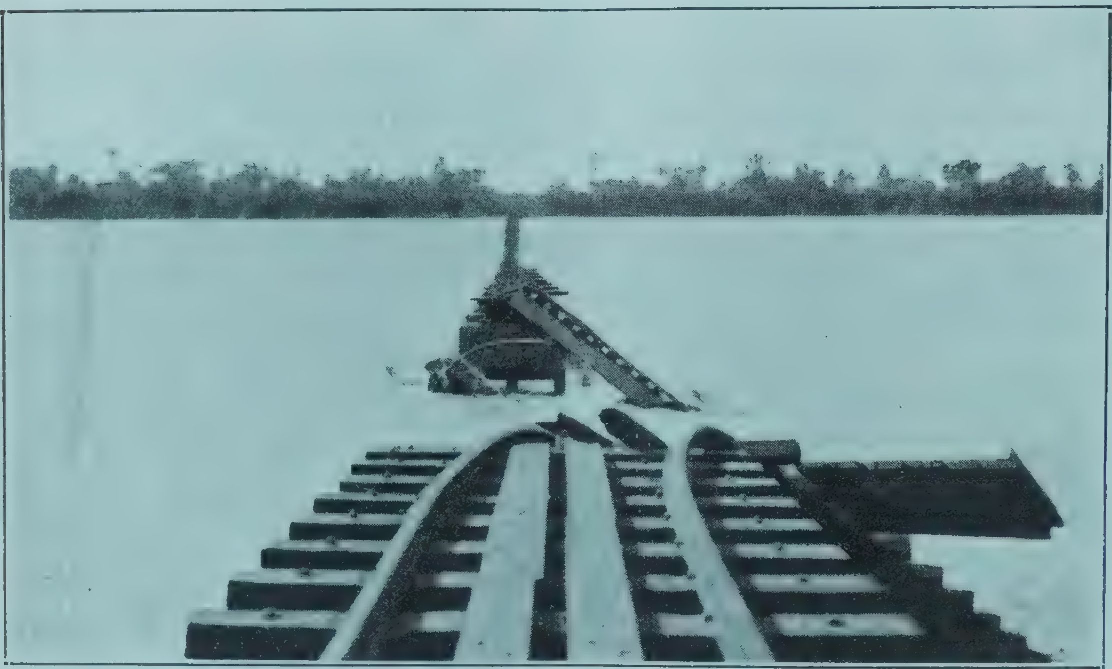


PLATE 19.—DAMAGE DONE TO RAILWAY BRIDGE OVER THE BURDEKIN RIVER BY FLOOD, 1916 (SOUTHERN END).

A reference to Table I. will show that the Lower Burdekin district is by far the most important as far as irrigation is concerned, and area for area the greatest sugar-producing district in Queensland. The sugar industry has for many years been one of the principal agricultural industries in the State, and a reference to Tables II. and III. will show how it compares with its only rivals. While in some years the area under wheat or maize may have exceeded that cropped for cane, the value of the sugar crop easily gives pride of place to sugar-cane. An examination of these statistics indicates the importance of the industry as compared with other forms of agriculture, and some credit for progress made is recorded by Major Boyd as being due to the late Hon. J. V. Chataway.

The lead given by sugar-growers on the Lower Burdekin does not appear to have been readily followed in other districts, though some steps had been taken to inaugurate irrigation at Bundaberg. The scheme here first considered embraced some of the Woongarra lands, with the Elliott River as the proposed source, but the first firm in the Bundaberg district to initiate a practical scheme was Messrs. Gibson and Howe.

BINGERA PLANTATION.

"Production and not acreage is the measure of profit, and moisture at the right time and at the right temperature all the time is the measure of production."

The Bingera Plantation is situated on the Burnett River, near Bundaberg. A small plant was first installed about 1888, sufficient to supply water to about 100 acres, and the results were sufficiently satisfactory to warrant the outlay for a proper installation capable of supplying water to the whole plantation. An order for a plant to lift 11,000,000 gallons of water in twenty-four hours was placed with Walkers Limited, of Maryborough, and as this was probably the first plant of its kind in Queensland a detailed description may be of interest.

The plant is located about 100 yards from the Burnett River, whence the supply is drawn. The river is subject to floods, and to safeguard the plant it has been placed well above the highest known water mark. Two horizontal cross compound condensing pumping engines with 16-in diameter high-pressure and 32-in. low-pressure cylinders and 48-in. stroke are connected by gearing to two sets of three throw

PLATE 20.—CITRUS ORCHARD, 12 MONTHS OLD.

pumps 32 in. diameter. The steam is supplied at a pressure of 150 lb. per square inch by two Lancashire boilers, 7 ft. 6 in. diameter by 26 ft. long. The pumps are placed in a shaft, 87 ft. deep by 17 ft. in diameter, and draw the supply from the river through a tunnel. The mains are 30 in. diameter (steel pipes), and the total lift is 252 ft. The storage capacity provided by means of dams is about 8,000,000 gallons (or 29 acre ft.). With this storage capacity the pumps may work continuously, but actual irrigation is only carried out during the hours of daylight. The reservoirs being placed at the highest points on the estate enables subsequent distribution to be done by gravity, and about two miles of 15-in. mains convey water to Hill End Estate, where irrigation is also practised.

Including pumping machinery, piping, channels, and grading, about £40,000 have been spent on this venture. Considerable trouble has been taken to get the land properly graded, without which no irrigation project can hope for success. When it is remembered that some years no use is made of the plant, it will be better recognised that irrigation can be made to pay. If it is assumed that only 1,000 acres were under cane, and a drought should occur, the saving in having the plant may easily represent the difference between, say, 50,000 tons and no crop.

A point to be noted is that intelligent irrigation does not lower the density or sugar contents of the cane. For the Bingera Plantation each application of water equals 2 in. to 3 in. per acre, or, say, 46,000 to 69,000 gallons per acre, and Mr. A. Gibson, writing in 1903, states: ''Regarding the sugar content of irrigated cane, I have not the least hesitation in saying that for quantity of juice and quality our irrigated canes of last year were better than anything we passed through our hands. Before me I have our chemist's report of an analysis of an eleven months' old cane of 29th July, 1902, showing Brix. 19.49, cane sugar 17.66, fruit sugar 0.71; and another of 28th August, ratoon crop, Brix. 20.09, cane sugar 18.90, fruit sugar 0.09. These figures speak for themselves. The canes were not picked samples. Regarding the tonnage of irrigated lands, this requires careful reply. Enthusiasts put Bingera crop down last year considerably over the mark, but all the same it was a great testimony to what can be done in a season such as 1902 was, when our rainfall for the crop was 8½ in. only. With or without irrigation, you are aware that certain conditions more or less govern the crop results, such as, for instance, quality of the soil, thorough and proper tillage before planting, healthy plants, length of growing season, fertilisers applied, &c. With irrigation, besides the above, the cane requires good water and plenty of it, properly applied during the growing season. Last year's crop did not have by any means a fair trial. We had irrigation only for four growing months, and our land was by no means properly laid out for irrigation. Again, the crop was almost ruined before the water was applied.

''This year's crop is equal to, if not better, so far, than last year's, with a rainfall of 9½ in., not including May, 1903, and irrigation only from 6th June. We have not yet thoroughly determined the value of fertilisers with irrigation, but putting our experience alongside Hawaiian experience it appears to us that tonnage results become a practical certainty. My idea is that for a certainty a crop from 30 to 50 tons can be reaped under the conditions I have named. Last, but not least, a good economical and reliable plant is the first requisite to obtaining the best results from irrigation. For large systems this cannot be too strongly impressed on intending irrigationists.''

It is regrettable that the warning thus given by a thoroughly experienced and eminently successful irrigationist cannot be heard by every farmer intending to instal a plan for irrigation. It might be added that no one should purchase a plant or decide what system to adopt until competent advice had been obtained. The primary factors almost certainly vary in every case, such as lay of land, kind and condition of soil and subsoil, crops to be grown, and water supply available. In utilisation of the water again, some cases require uniform flooding, while others would give a better result if a furrow system, or a sprinkling service, were used. In one case brought under the writer's notice, £1,400 had been spent where £800 would have given as good, if not a better, result, and many cases are known where savings of from £100 upward could have been effected by obtaining advice costing but a small portion of the saving effected thereby.

Irrigation has also been practised at ''The Cedars,'' a sub-estate of Bingera, provided with an independent supply, the lift here being only 90 ft.

To the farmer who labours under the common delusion that ''if a little water is good more water is better,'' it will be an eye-opener to learn that in this example of successful irrigation each application of water consists of but from 2 to 3 in. per acre at the time. The number of waterings per season must, of course, depend on the times and amounts of the rainfall.

IRRIGATION AT FAIRYMEAD.

''The best way to find out how to do a thing—Go and do it.''

During the protracted drought occurring at the commencement of this century, the necessity for irrigation was sorely felt at Fairymead. All the more so as at this time the cane on an adjoining plantation bore evidence of the effect of water properly applied. Messrs. Young Brothers recognised that if they desired to safeguard against further losses of a similar nature irrigation must be established.

A trial spear driven into the ground rewarded the attempt by a display of water rising almost to the surface. Having made this gratifying discovery, Mr. Young paid a visit to Burdekin, and on his return to Fairymead immediately inaugurated irrigation on similar lines. Had no water been available practically no cane could have been supplied to the mill during the crushing of 1903, but with irrigation the crop obtained ranged from 30 to 60 tons per acre.

About July, 1903, no less than eleven separate plants had been installed on this plantation, and, though (as at Bingera) years may occur when irrigation is not

necessary, the outlay is more than compensated for by the sure returns of a crop every year.

On some of the smaller holdings irrigation has also been attempted, but the pumps are not started unless the dryness of the season appears to endanger the crop. The Elliott River scheme, already mentioned, was the first attempt at a large scheme for a group of settlers, and an outline of its history is given below.

ELLIOTT RIVER SCHEME.

An Order in Council issued 24th April, 1903, authorised the Woongarra Irrigation Board to draw 60,000,000 gallons of water per week from the Elliott River during the period from 1st September to 1st May following. This board was formed in connection with the Woongarra lands. The area under consideration comprised 3,000 acres. The quantity to be pumped, expressed as acre feet, is 223, very nearly; and if the distribution of this amount were possible without loss, each acre would have received 0.82 in. per week during the irrigating season. As seepage and

PLATE 21.—REGULATORS ON MAIN CANAL, YANCO.

evaporation losses would probably have accounted for fully half this amount, and the remaining quantity is quite inadequate to be depended upon, Dr. Maxwell, amongst others, reported adversely upon the proposal. Persistent efforts on the part of those concerned led, however, to the undertaking of a fuller investigation, which also included an estimate for the provision of storage works in the river of a sufficient capacity. From these storage works the water was to be pumped to a high-level reservoir, the suggested site for which was in a declivity between two spurs of the "Hummock," at a distance of over eight miles from the pumping station. From this high-level reservoir distribution by gravity, either through pipes or channels, had to be effected.

The first cost of the scheme was estimated at about £170,000 without maintenance or working expenses. With these, added to interest and redemption charges, the annual cost for water only was calculated to be £5 15s. per acre. This charge being clearly too great compared with the then ruling price for cane the scheme was abandoned.

Underground supplies were also investigated, but though the engineer making the investigation stated that he recognised that a fairly large catchment area (144 square miles) with only a small run-off should have produced a fair underground supply, he had not been lucky enough to find it.

IRRIGATION AT BOWEN.

"In the home of prosperity the value of water is known."

The Lower Burdekin and the Burnett districts have been, and are, the only localities where irrigation has been practised generally on a fairly large scale. Irrigation at Bowen is carried out from wells for growing citrus fruits and vegetables, principally tomatoes, and the area under irrigation at Bowen is steadily increasing. The supply from the wells is good and the water soft and suited to the purpose.

Though the source of supply at Bowen, as on the Burdekin, is obtained in a delta formation, tube wells are not used because the depth to water below surface is greater than on the Burdekin delta. Difficulties met with in sinking wells near the Burdekin do not appear at Bowen, the formation under the surface at the latter place being firmer. Water appears, however, to be just as abundant at both places, though the area over which it can be obtained with ease on the Don River is not as great as on the Burdekin.

Where fruit is grown by irrigation, as at Bowen, the necessity for care and cleanliness in the orchard is of paramount importance. It is of little use for odd

PLATE 22.—PEACH ORCHARD, FOUR YEARS OLD, YANCO.

farmers to strive for good results and clean fruit unless those more lax, or perhaps unaware of the danger incurred in not taking every precaution, are compelled to observe the necessary care. Some instances were noted at Bowen, where drastic powers freely exercised would not have been out of place. It is confidently hoped by those concerned that legislative measures will be taken in this respect, and provision for their enforcement made. Citrus fruits of a very fine quality can be grown in this district and possibly this industry, if carefully supervised, would prove more lucrative than any other.

As an instance of what could probably be regularly done if an export market were established, the following data obtained from the Yanco Experimental Farm may be of interest:—Seven cases of oranges and fifteen of lemons sent from Yanco in July, 1913, cleared net 14s. 3d. per case of oranges and 12s. 3d. per case of lemons. On 31st August, one month later, another lot sent only cleared 8s. 4d. per case of oranges and 2s. 3d. per case of lemons, due to the late shipment. Fruit grown in northern parts of Queensland could always be sent early enough to catch the early market.

It must not be forgotten that irrigated fruit (that is, citrus) does not carry or keep as well as the normally grown citrus. There is no doubt that some means can be found of overcoming this difficulty and as our product increases the question

may be of sufficient importance to be taken up in earnest. A firm of Tasmanian fruitgrowers appear to have overcome the difficulty attending shipping of citrus fruits. By means of thoroughly air drying the fruit, skin moisture is got rid of, and as skin moisture is generally considered the cause of the trouble citrus growers would do well to fully investigate the process.

At present, however, the Bowen district is better known by its production of tomatoes, which often find their way to very distant markets.

Very few irrigators in this district have as yet tried the benefit of grading. The experienced irrigator will find this statement difficult to believe, but as a rule grading is considered superflous. It may, however, be accepted as an axiom that where grading has not been done, irrigation, though perhaps successful at first, is certainly not efficient. There are admittedly some fields where the natural slope is such that no adjustment is necessary, and if the head ditch is properly placed conditions are perfect for efficient irrigation. But such cases are very scarce, and where nature has not attended to the grading the would-be successful irrigator *must*.

Some are afraid that taking the soil from the higher places and dumping it in the hollows will expose subsoil to such an extent that the crop will be patchy. There is but little danger of this if the grading is intelligently carried out, because subsequent ploughing and harrowing so counteracts any danger in this respect as to practically eliminate it. As a result of grading the irrigation can be carried out with ease and one man can do all the work necessary when irrigating an average crop. Without grading irrigation becomes a drudge of shovel work to be done and undone every time an application of water is necessary.

Apart from the labour necessary, there is a very real danger present where grading is not carefully attended to. Every farmer who has tried to irrigate an ungraded or badly graded plot of land knows that the hollows will fill with water in spite of him. Watch the result. Is not the crop in such hollows generally poorer than if it had been grown on the "bare" patch of subsoil exposed by grading?

This constant filling up of the lower portions of a field with water ultimately tends to water-log the ground. To cure water-logged ground may be a much more expensive job than to provide a water supply for dry ground. It is in this respect that the irrigator should be wise and beware.

(The next instalment will cover Irrigation in the West.)

A NEW AMERICAN RECORD.

A new American record for butter production has been established. With a yearly semi-official record of 1,218.59 lb. butter fat, equivalent to 1,523.2 lb. of butter from 31,610.6 lb. of milk testing 3.85 per cent. May Walker Ollie Homestead, a seven-year-old Friesian, is now the champion butter-producing cow over all breeds and ages. As a result of this performance, which was completed on 18th December, she exceeds the former American record made over seven years ago by Duchess Skylark Ormsby.

A study of May Walker Ollie Homestead's 365-day production record shews that she is a consistent and even producer. In no one calendar month did she produce less than 80 lb. butter fat or 2,000 lb. milk, nor did she go over 3,000 lb. milk in any one month. She carried a calf for almost six months of her test period.

The supervision of her test was very thorough. In 23 test periods, of which 18 were retests, 18 different supervisers of the Minnesota College of Agriculture were in charge.

Her constitution and strength stood her in good stead, for she finished her test weighing 1,765 lb.—the same weight at which she entered her tests period a year ago.

In addition to being the possessor of the American record for butter production, May Walker Ollie Homestead has two other 365-day records which are highly creditable for her age. As a four-year-old she produced 1,096.6 lb. of butter with 22,535.8 lb. of milk in one year on semi-official test while carrying a calf for eight months. Previously, as a senior three-year-old, she produced in 304 days 583.83 lb. butter with 11,622.9 lb. of milk, carrying a calf 192 days.

TOOWOOMBA EGG-LAYING COMPETITION.

Following are the results of the egg-laying competition which is being held under the auspices of the N.U.P.B.A. (Toowoomba Branch) at Charlsmith Farm, South street, Toowoomba:—

White Leghorns.

No.	Name.	Total.	B/M Score.
53	C. A. Keen	87	12
13	D. Dippel	84	10
15	R. C. Cole	83	13
2	Jas. Hutton	82	12
56	Enroh Pens	81	12
1	Jas. Hutton	80	10
48	S. Mansbridge	80	11
37	Parisian P. Yards	78	11
54	C. A. Keen	77	11
14	D. Dippel	76	9
16	R. C. Cole	76	10
10	H. Hindes	75	8
7	G. Stilton	74	11
5	H. Grant	71	11
26	R. W. Shaw	71	11
50	A. R. Petty	71	12
44	P. J. Fallon	70	9
8	G. Stilton	68	10
9	H. Hindes	66	8
12	S. Chapman	65	10
22	J. W. Short	65	11
29	W. Cummings	65	11
36	H. G. Shaw	65	12
11	S. Chapman	64	10
3	J. N. Jones	63	11
6	H. Grant	63	8
51	Alf. Walker	63	1
4	J. H. Jones	62	1
21	J. W. Short	61	6
24	Jas. Goggins	60	7

No.	Name.	Total.	B/M Score.
17	Geo. Lawrenson	57	8
18	Geo. Lawrenson	57	9
47	N. Mansbridge	55	9
26	W. S. Adams	54	11
30	W. Cummings	54	0
33	Mrs. F. Bliss	54	8
28	E. Wiles	53	11
57	J. W. Newton	51	5
19	R. W. Shaw	50	10
49	A. R. Petty	49	10
27	E. Wiles	46	9
46	R. C. J. Turner	45	11
35	N. G. Manning	40	11
38	Parisian P. Yards	40	10
52	Alf. Walker	40	3
25	W. S. Adams	39	3
34	Mrs. F. Bliss	38	11
45	R. C. J. Turner	37	9
55	Enroh Pens	30	12
58	J. W. Newton	30	5
59	C. E. Rogers	24	11
39	Vic. Brand	22	10
43	P. J. Fallon	20	0
31	Jas. Taylor	19	9
41	Stan. McBean	17	2
23	Jas. Goggins	13	0
40	Vic. Brand	10	7
42	Stan. McBean	10	6
60	C. E. Rogers	7	7
32	Jas. Taylor	5	0

Black Orpingtons.

No.	Name.	Total.	B/M Score.
88	Marville P. Yards	94	15
111	T. J. Carr	94	13
121	Jas. Hutton	93	12
112	T. J. Carr	91	12
127	E. Walters	90	13
97	R. Burns	89	14
86	T. J. Moloney	86	14
95	S. H. K. Champion	86	10
131	H. B. Stephens	85	13
122	Jas. Hutton	84	12
103	E. F. Dennis	82	12
116	Cliff. Lavers	82	13
90	W. Wilson	81	11
107	R. Holmes	79	12
117	Mrs. L. Maund	79	12
132	H. B. Stephens	78	10
83	Wombo P. Yards	77	12
109	D. Dippel	75	14
94	N. Mansbridge	74	13
128	E. Walters	74	11
115	Cliff. Lavers	73	11
84	Wombo P. Yards	70	10
110	O. Dippel	70	13
114	Ken. McFarlane	70	12
89	W. Wilson	66	10

No.	Name.	Total.	B/M Score.
101	R. W. Shaw	64	12
113	Ken. McFarlane	64	9
87	Marville P. Yards	63	11
104	E. F. Dennis	63	12
105	R. R. Rivett	63	12
124	G. E. Rogers	59	11
102	R. W. Shaw	55	10
123	G. E. Rogers	54	11
96	T. C. Ollier	50	11
120	Parisian P. Yards	46	12
92	S. H. K. Champion	45	9
106	R. R. Rivett	41	9
91	S. H. K. Champion	40	11
130	G. Radford	39	9
85	T. J. Moloney	39	0
19	Parisian P. Yards	38	9
99	Mrs. G. H. Kettle	37	8
29	G. Radford	36	10
93	N. Mansbridge	33	4
98	R. Burns	33	10
108	R. Holmes	30	15
100	Mrs. G. H. Kettle	23	1
126	C. E. Dennis	16	13
118	Mrs. L. Maund	8	5

TOOWOOMBA EGG-LAYING COMPETITION—*continued.*

OTHER BREEDS.

No.	Name.	Total.	B/M Score.	No.	Name.	Total.	B/M Score.
76	W. Becker (C.L.) ..	80	12	81	C. G. Warrian (P.R.)	53	9
73	H. Dibbs (C.L.) ..	76	10	79	A. W. LePla (R.I.R.)	49	8
68	R. W. Shaw (B.L.) ..	72	10	77	W. Paulsen (P.R.) ..	31	16
64	T. J. Carr (S.W.) ..	69	8	61	Mrs. L. Maund (C.W.)	23	9
82	C. G. Warrian (P.R.)	66	11	62	Mrs. L. Maund (C.W.)	21	0
63	T. J. Carr (S.W.) ..	65	9	69	Parisian P.Y. (B.L.)	21	7
67	R. W. Shaw (B.L.) ..	65	10	65	J. W. Short (B.L.) ..	21	9
71	J. W. Allatt (Campine)	64	10	70	Parisian P.Y. (B.L.)	17	5
75	W. Becker (C.L.) ..	64	11	80	A. W. LePla (R.I.R.)	13	11
74	H. Dibbs (C.L.) ..	61	15	72	J. W. Allatt (Camp.)	9	4
66	J. W. Short (B.L.) ..	53	10	78	W. Paulsen (P.R.) ..	6	0

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JUNE, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JUNE, 1923 AND 1922, FOR COMPARISON.

Divisions and Stations.	Average Rainfall. June.	Average Rainfall. No. of Years' Records.	Total Rainfall. June, 1923.	Total Rainfall. June, 1922.
North Coast.	In.		In.	In.
Atherton	1·58	22	0·65	1·31
Cairns	2·86	41	1·36	2·71
Cardwell	2·06	51	2·04	1·50
Cooktown	2·03	47	0·38	1·48
Herberton	1·01	36	0·96	0·94
Ingham	2·43	31	2·14	1·75
Innisfail	7·10	42	2·15	9·37
Mossman	2·32	15	2·53	1·58
Townsville	1·25	52	2·43	0·19
Central Coast.				
Ayr	1·28	36	3 93	0·73
Bowen	1·58	52	2·36	0·50
Charters Towers ...	1·30	41	1·77	0·30
Mackay	2·68	52	5·27	1·34
Proserpine	3·64	20	3·33	1·26
St. Lawrence ...	2·44	52	3·61	1·46
South Coast.				
Biggenden	1·86	24	4·90	2·38
Bundaberg	2 69	40	4·10	1·57
Brisbane	2·64	72	2·66	1·83
Childers	2 20	28	4·27	2·33
Crohamhurst ...	4·16	30	2·89	1·81
Esk	2·03	36	2·53	1·24
Gayndah	1·87	52	3·39	1·36
Gympie	2·52	53	3.60	3·13
Glasshouse Mts. ...	3·94	15	2·70	1·66
Kilkivan	2·05	44	3·54	1·28
Maryborough ...	2·85	52	4·39	2·80

Divisions and Stations.	Average Rainfall. June.	Average Rainfall. No. of Years' Records.	Total Rainfall. June, 1923.	Total Rainfall. June, 1922.
South Coast— continued :	In.		In.	In
Nambour	3·36	27	3 12	2·02
Nanango	2·04	41	2·31	1·47
Rockhampton ...	2·34	52	3·91	1·82
Woodford	2·66	36	2·44	2·23
Darling Downs.				
Dalby	1·70	53	2·21	2 55
Emu Vale	1·44	27	1·84	1·55
Jimbour	1·73	35	2·23	2 45
Miles	1·92	38	2·79	2·04
Stanthorpe ...	1·88	50	2·95	1·49
Toowoomba ...	2·35	51	2·83	1 64
Warwick	1·80	58	2·02	2 08
Maranoa.				
Roma	1 72	49	2·78	3 27
State Farms, &c.				
Bungeworgorai ...	1·78	9	2·74	2·58
Gatton College ...	1.72	24	2·37	1 03
Gindie	1·53	24	3·62	1 10
Hermitage ...	1·97	17	1·98	2 10
Kairi	1·32	9	...	1 84
Sugar Experiment Station, Mackay	2·32	26	5·25	0·91
Warren	1·86	9	2·68	1·54

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for June this year, and for the same period of 1922, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
State Meteorologist.

General Notes.

New Agricultural Measures.

New legislation relating to rural interests and initiated by the Minister for Agriculture and Stock (Hon. W. N. Gillies) include an amendment of the Dingo and Marsupial Destruction Act, a Diseases in Poultry Bill, a Pest Destroyers Bill to regulate the sale of insecticides, fungicides, vermin and weed destroyers. As the session advances other beneficial agricultural legislation will be introduced.

A Jersey Test.

The Secretary of the Jersey Cattle Society of Queensland advises that Carlyle Lady Lynn, the property of Mr. J. Williams, Woodbine, Kingaroy, has completed the 273 days' test, with a yield of 6,511 lb. milk, and 375.61 lb. fat, equal to 441.91 lb. commercial butter in the period. Carlyle Lady Lynn is by Master of Lynn (imp.), (717), and her dam was Lady of Carlyle (751, vol. 6). She was seven years of age at the beginning of her test.

Marketing of Ratoon Cotton.

Replying to a question in Parliament on the subject of the disposal of ratoon cotton, the Minister for Agriculture and Stock (Hon. W. N. Gillies) stated that the Agent-General, who is quite alive to the position, and after making discreet inquiries amongst English spinners, had cabled that ratoon cotton is not wanted. Inquiries already made indicated that the average market price for such cotton would only ensure the Queensland grower from 2d. to 2½d. per lb. in the seed. Our experts advise that our only hope of permanently establishing an industry that will stand on its own feet is to produce a high standard of annual cotton.

Recent Illawarra Figures.

The Secretary of the Illawarra Milking Shorthorn Society of Australia advises that Garnet of Fairfield and Duchess of Fairfield are the two latest heifers to complete the 273 days' test for the advanced register of the Illawarra Milking Shorthorn Herd Book of Australia. Both heifers are the property of Mr. F. E. Birt, Fairfield, Sexton. Garnet of Fairfield (710), by Dandy of Blacklands (36), ex Lettie of Fairfield, yielded 9,015½ lb. milk and 393.61 lb. fat, equal to 463.08 lb. commercial butter. She was two years and five months old at the beginning of her test. Duchess of Fairfield (708), by Dandy of Blacklands (36), ex Queenie of Fairfield (885), yielded 9,523 lb. milk and 370.65 lb. fat, equal to 430.06 lb. commercial butter. She was two years and eight months old at the beginning of her test.

Crown Lands Selection.

In the period of six months ended on 30th June last, 561 persons in Queensland took up 2,216,207 acres of Crown land. A return issued by the Lands Department last week shows that the rental in respect of these selections totals £11,530. In the corresponding period of 1922, the number of selectors was 582, the area was 1,380,716, and the rental £10,821.

Last month 82 persons took up 473,846 acres of Crown land, at a total rental of £1,849. In June of last year 96 selectors took up 169,577 acres, for which the rental is shown at £861.

Atherton Pig Pool.

Upon the recommendation of the Council of Agriculture, the Governor in Council, by Order in Council, has declared that pigs grown in the Petty Sessions Districts of Atherton, Herberton, and Chillagoe, to be a Commodity under the Primary Products Pools Act. A Board, consisting of the following members has also been appointed, and which Board will administer the affairs of the Atherton Tableland Pig Board up to the 30th June, 1924:—

ROBT. CAMPBELL, of Peeramon,
MICHAEL LYNCH, of Peeramon,
GEO. R. DAVIDSON, of Peeramon,
CLARENCE H. JURD, of Millaa Millaa, and
CHAS. W. ROSEBLADE, of Yungaburra.

Potash for Potatoes.

Potato experiments in Northamptonshire in 1922 showed that muriate of potash and sulphate of magnesia gave the heaviest yield per acre—viz., 13 tons 13 cwt. The plot without potash gave the lowest yield 7 tons, and a natural manure like kainit, which contained about 14 per cent. of potash, gave lower yields than other forms of potash. In 1921 a plot receiving magnesia with potash also gave the highest yield. All the plots received a dressing of 2 cwt. sulphate of ammonia, and 6 cwt. superphosphate. The potash dressings were arranged to supply the same amount of potash as 2 cwt. sulphate of potash per acre.—"Australasian."

Beerburrum Dehydrated Products.

Bottles of bananas and pineapples treated by the Beerburrum Co-operative Company's dehydration process are at present displayed in the Queen street window of the Sanitarium of Health Company's premises. The exhibits are an excellent example of the efficiency of the dehydration process. The fruit appears to have retained its original colour and conveys the impression that, as an edible, it would be equal to fruit in its natural state. The Empire Exhibition Commission have authorised the expenditure of £20 to purchase dehydrated tropical fruits of this kind to display in London. Samples of dehydrated pineapples and bananas were shown at a recent conference of the Australasian Fruit Growers in Melbourne, and were much admired.

Pest Destroyers Bill.

In submitting this measure to Parliament, Mr. Gillies said the fruit section of the Council of Agriculture for some considerable time had been asking that legislation of this character should be placed on the statute-book. At the conference of Ministers at Perth last year, resolutions on the question were passed, and various conferences of agricultural chemists have dealt with the matter. Similar legislation is on the statute-books of Victoria, South Australia, and all the States of America in connection with sheep dip, sprays, and various pear poisons and other mixtures sold, and it is necessary that the farmers should be protected. Tests will be made, the sellers must be registered, and generally the farmers will be protected against paying high prices for stuff that is of no value.

Atherton Tableland Maize Board.

Notice has been given that it is the intention of the Governor in Council, upon the recommendation of the Council of Agriculture, to declare that maize produced from seed sown after the 1st July, 1923, in the Petty Sessions Districts of Atherton, Herberton, and Chillagoe, is and shall, for a period of ten years as from the 1st July, 1923, be a commodity under "*The Primary Products Pools Act of* 1922;" and also to constitute a Board in relation to such commodity.

Any petition for a poll to decide whether the above Order shall be made must be signed by at least fifty maize-growers of one acre or more in the above Petty Sessions Districts and must reach the Minister before the 24th August, 1923.

Nominations will be received by the Under Secretary, Department of Agriculture and Stock, up to the 24th August, for election for one year as Growers' Representatives on the Atherton Tableland Maize Board. Each nomination is to be signed by at least ten maize-growers who grew, during 1923, one or more acres of maize.

Friesian Herd Tests.

The Secretary of the Friesian Cattle Club of Australia (Mr. R. S. Maynard) advises that the following cows have completed their 273 days' tests for the Herd Book:—Belle of Friesland 2nd, by Colantha Pontiac, 569, N.Z.H.B., ex Belle of Friesland, 646, N.Z.H.B., at the age of six years and three months, yielded 14,229¾ lb. milk, and 509.29 lb. fat, equal to 599.40 lb. commercial butter. Colantha Wild Rose, by Colantha Pontiac, 569, N.Z.H.B., ex Friesland Wild Rose, 638, N.Z.H.B., yielded 14,181¼ lb. milk, and 498.12 lb. fat, equal to 586.03 lb. commercial butter. She was seven years of age at the beginning of her test. Anna of Brundee, by King of Brundee (181), ex Annette 2nd of Brundee, nine years of age at the beginning of her test, yielded 12,116 lb. milk, and 444.03 lb. fat, equal to 522.40 lb. commercial butter in that period. These three cows are the property of Mr. G. Newman, St. Athan, Wyreema. Another Friesian heifer, which has just completed her test, with very creditable results, is Psyche 2nd of St. Gwithian, the property of Mr. S. H. Hosking, St. Gwithian, Toogoolawah. At the age of two years four months she yielded 12,285¾ lb. milk, and 454.45 lb. fat, equal to 534.65 lb. commercial butter in 273 days. She is by Jewel's Maxwell of Brundee ex Psyche (app. vol. 1).

Turkeys in the Cotton Field.

A writer in "The Reliable Poultry Journal" (March), discussing the practical side of turkey breeding and rearing, says that turkeys do a great service to farmers in the United States by cleaning up insect pests. Turkey raisers in the South, especially, have found that the presence of a flock of turkeys in their cotton fields means a big reduction in the damage caused by the boll weevil.

Cost of Cotton Seed for the Coming Sowing.

Replying to a question in Parliament, the Minister for Agriculture and Stock (Hon. W. N. Gillies) made it clear that the charge for seed for the coming planting will be ½d. per lb. From 10 to 15 lb. will plant an acre. The average area under cotton per cotton-grower last year was 7 acres. The total cost per farmer will therefore not exceed a few shillings. The proceeds of sales are paid into the Cotton Fund, and will either be paid to the growers or used to make good any loss arising out of the guarantee.

Dairy Shorthorn Points.

An English studmaster recently demonstrated to a party of students the essential points of a good dairy Shorthorn cow. As a primary point he laid considerable stress on the value of free and graceful carriage. If the action were not good, one of two things was the cause—either the animal had been overfed or had a hereditary weakness. The points of the head were the usual—longish head, wide muzzle, and bright eye—but a few black spots on the muzzle did not necessarily bar an animal from a distinguished career. Then the shoulders must be narrow. This point combined with width across the hookbones gave the characteristic wedge-shape of the dairy cow. A well-defined escutcheon always pointed to a good cow, yet many good cows were found with a poor escutcheon. Common sense would suggest that in the dairy cow the udder was the most important part. The shape of this must be as half mooned as possible, coming well down behind and stretching far forward under the belly, and not divided. The teats must be set on evenly at the four corners and the skin must be fine, silky, and very elastic to the touch. The milk veins must be thick and tortous. The question of milk pedigree was then discussed, and the opinion was expressed that if there were four or five good dairy bulls on the top of the pedigree there was no need to lay any emphasis on a long pedigree stretching back to remote ancestry, however good. From the milk point of view the value of the dairy bull was to be based on his milk ancestry, and in actual appearance he must be as masculine a type as the beef bull. Feminine appearance belonged to the cow and not to the bull.

N.U.P.B.A. Activities—Meat Meals as Poultry Food.

At the last monthly meeting of the National Utility Poultry Breeders' Association a paper, by Mr. W. H. Paine, on the value of meat meals as poultry food was read by the secretary, Mr. Kidd. A lively discussion followed on the use of dried blood as a protein food. Mr. Paine, basing his opinion on the analyses and experiments carried out by southern chemists, claimed that dried blood, if not injurious, is absolutely valueless to poultry. Mr. M. H. Campbell took the opposite view, and stated that he had used this ingredient in his mashes for many years with very satisfactory results, provided that the blood had been prepared and dried by the modern method of heating in a vacuum, which prevents the destruction of the vitamins, as was the case with the old-fashioned retort method. The latter had the effect of carbonising the blood, which rendered it indigestible and of about the same feeding value as ashes. Several other practical farmers supported Mr. Campbell's views, and it was decided to request the Council of Agriculture to settle the question at one of the feeding tests to be held at the Gatton College shortly. It was suggested that individual breeders should hold tests in their yards and report results, and also that a special sub-committee be appointed to work out a suitable ration. It was further suggested that proprietary meat-meal manufacturing firms be written to for an expression of opinion on this question.

Opossum Season Closed.

The Minister for Agriculture (Hon. W. N. Gillies), replying to a question in the House, stated definitely that the open season for opossums will not be extended.

African Maize Purchase.

Public attention has lately been given to the importation and local purchase of African maize, and to make clear the extent of the operation of the State Produce Agency in overseas grain the Minister for Public Works (Hon. W. Forgan Smith), replying to a question in Parliament, stated that the State Produce Agency's buying of African maize amounted to 100 tons at 5s. 11d. in store, Brisbane, and the purpose of the purchase was to ensure supplies for country customers (mostly poultry farmers) at prices that would enable the Agency to compete with Queensland produce merchants, who had, according to report, purchased African maize up to 5,000 tons.

Queensland Cotton on the Liverpool Market.

The British Australian Cotton Association has received a cable message from its Liverpool office that 130 bales of A grade Queensland cotton, shipped by the "Runic," has been sold on the Liverpool market for 15¼d. per lb., which is about 2¾d. above the price of middling American cotton. The association also states that it shipped 841 bales of cotton from Rockhampton in May by the steamer "Woodarra," which was recently on fire; apparently this has been confused in the report with wool. Cotton with a grade of similar variety has recently brought 2¾d. above middling American. The Liverpool cotton is fully insured.

Cotton Seed Receipts.

The British Australian Cotton Association advises that the receipt of seed cotton at the various ginneries to 17th July was as follows:—

Ginnery.	Net weight.	Amount.
	lb.	£ s. d.
Rockhampton	3,193,964	69,835 13 0
Wowan	1,757,941	40,275 8 8
Whinstanes	3,771,920	85,706 14 7
Gayndah	711,816	16,311 9 8
Dalby	402,161	9,215 12 1
Totals	9,837,802	£221,344 18 0

The Queensland Sugar Crop, 1923.

Queensland is expected to produce in the 1923 sugar season about 240,000 tons of raw sugar. This estimate has been made by the Director of Sugar Experiment Stations (Mr. H. T. Easterby) from figures recently supplied.

He said recently that this with the New South Wales (cane) and the Victorian (beet sugar) production would make some 258,000 tons of sugar for Australia. In addition to this, there was the present carry over of about 55,000 tons of sugar, so that there would be, at the end of the 1923 season, another carry over, but of a smaller amount. The production in Queensland last year was, in round numbers, 288,000 tons of sugar.

Due to the extremely dry weather experienced during the early part of the year, this season's production would show a decrease of some 48,000 tons of sugar. It would, however, be much larger than the crops of 1918, 1919, and 1920. The record crop was that of 1917, when 307,000 tons of raw sugar were produced. In 1921 the yield was 283,198 tons of sugar, so that the expansion of the sugar industry in the past two years, during the currency of the late sugar agreement, had been most marked. The present crop, of course, also was planted while the agreement was in force.

Codlin Moth Control.

At the last monthly meeting of the Fruitgrowers' District Council, Mr. Henry Tryon (Government Entomologist) addressed the delegates on the codlin moth pest. He traced the life history of the codlin moth, and advocated spraying in the early spring, just as the petals were falling.

One of the delegates raised the question of the pemble injury to bees by the arsenate of lead spray used to kill the codlin moth, and stressed the point that bees were one of the fruitgrowers' best friends.

Mr. Tryon said that he was conscious of that, but pointed out that if spraying were carried out at the time he advocated—that is, when the petals were falling—no injury would be done to the bees.

Mr. Ward (Chief Instructor in Fruit Culture) also spoke on the question of dealing with the codlin moth, and said that if three sprayings were effectively carried out he would guarantee that loss by the codlin moth could be reduced to 1 per cent. He only wished they could deal as effectively with the fruit fly as they could with the codlin moth.—"Courier."

Staff Changes and Appointments.

Inspector Charles Edward Ford, of the Pioneer Shire Council, Mackay, has been appointed an officer under "*The Animals and Birds Act of* 1921."

Mr. A. J. Caswell and Edwin Franklin, of Wangalpong, have been appointed officers under "*The Animals and Birds Act of* 1921."

Police Constable H. J. A. Bovard, of Miles, has been appointed an Inspector of Slaughter-houses.

L. W. Ball, Temporary Agricultural Field Assistant in connection with the establishment of the Cotton Experiment Plot, Upper Burnett District, has been appointed as an Agricultural Field Assistant, Department of Agriculture and Stock, as from the 1st July, 1923.

The Officers in Charge of Police at Surat and Injune, together with Police Constable R. J. Hamilton, of Miles, and Police Constable J. Mahon, of Injune, have been appointed acting Inspectors under "*The Diseases in Stock Act of* 1915."

The Police Magistrate, Bowen, has been appointed Government Representative of the Bowen Dingo Board.

The resignation of S. K. Crowther, Inspector of Dairies, Kingaroy, has been accepted as from the 6th August, 1923.

Dairying in the Central Burnett.

Dairying was given the first uplift by the formation of the Gayndah Co-operative Company in 1910. This company has made marked progress. In 1911 there were 76 suppliers; the present total is 350. In 1922 (with a seven months' drought) 502,140 lb. cream was supplied to the factory, and to such an extent has the supply increased that additional plant has become necessary. This has entailed an expenditure of £7,000, including an 800-gallon Batch pasteuriser, 20-ton refrigerating compresser, 6,000-gallon cold water tank, and 50 h.p. boiler, with extensions to the ice plant, cream room, and manufacturing room. The Maryborough Co-operative Company has butter factories at Biggenden and Mundubbera, which are up to date in every way. These three concerns turn out an average of over 60 tons of butter weekly. In 1915 the Gayndah Company opened cheese factories at Byrnestown and Binjour Plateau, and the Maryborough Company a cheese factory at Branch Creek, each of which turns out, on an average, about 1 ton of cheese per week. Cheese factories, owned by farmers in the localities on the co-operative principle, have been established at Dundarrah and Emu Creek. These also have a weekly output very little under the other factories. Ready markets are found for the product in various parts of the State and in England. The Gayndah factory has a big business connection with Central Queensland. The industry has grown so rapidly that even with these demands of the cheese factories there has been no diminution of cream to the butter factories. Burnett people assert that their district is destined to be the premier dairying part of Queensland, for they have the country and a good average rainfall. Dairymen have made it their aim to procure good stock, and they declare that the yield per cow will compare with that of any part of Australia.

Advisory Board for Government Stallions.

Messrs. E. Baynes, J. Tait, A. H. Cory, M.R.C.V.S., H. C. Quodling, and the Under Secretary for Agriculture (Mr. E. G. E. Scriven) have been appointed members of a Board for making arrangements for the service of the stallions recently purchased by the Queensland Government, the conditions on which mares will be received for service, and other matters in relation thereto.

Prickly-Pear as Fodder—New Machine Tested—A Correction.

In the course of a brief reference to a machine for treating prickly-pear for the purpose of making it more palatable as stock food, patented by Mr. L. W. Page, of Warra, and appearing under the above heading in the July Journal, it was stated that the machine was capable of "treating 3 or 4 tons daily." The error is evident. Obviously the statement should have read "3 or 4 tons *per hour*," and we are taking the earliest opportunity of correcting a palpable mistake.

Pigs, Bacon, and Fixed Prices.

Replying to a question in Parliament as to whether, in view of the present high cost of feeding pigs, he would direct the Commissioner of Prices (Mr. Ferry) to cancel all notifications fixing the prices of hams and bacon, the Premier and Treasurer (Hon. E. G. Theodore) said: Decontrol is unnecessary, as any increase in the price paid by the factories for pigs is allowed in the wholesale price. Fixation does not, therefore, affect the price of pigs. Further, the limiting of profits on the retail prices of such commodities encourages consumption, and to such extent stabilises prices paid to the producer. In the course of the current week the decontrol of prices as desired by the honourable member had also been urged on the Commissioner by the proprietary companies, and strongly opposed by a co-operative representative.

CERTIFICATES OF SOUNDNESS.

Certificates of Soundness were issued for Stallions listed as under in the course of the period July 1–26 :—

Name of Stallion.	Class.	Period for which Certificate issued.	Owner's Name.	Owner's Address.
Black Mac ..	Pony ..	Life ..	P. Lyne ..	Laidley
The Sheik ..	Pony ..	12 months	G. E. Jackson..	Eagle street, Brisbane
Delor Rex ..	Trotter ..	12 months	W. G. Arnold ..	Crosbie street, Milton, Brisbane
Prince George	Draught ..	12 months	W. Preefert ..	Summer Hill, Laidley

PLATE 23.—QUEENSLAND BANANAS IN TRANSIT TO MARKET.

PLATE 24. CANE CUTTING, BABINDA.

Plate 25.—A Good Cane Crop, Lower Burdekin.

Plate 26.—Fifty Tons of Sugar-cane per Acre, Lower Burdekin.
See "Irrigation in Queensland."

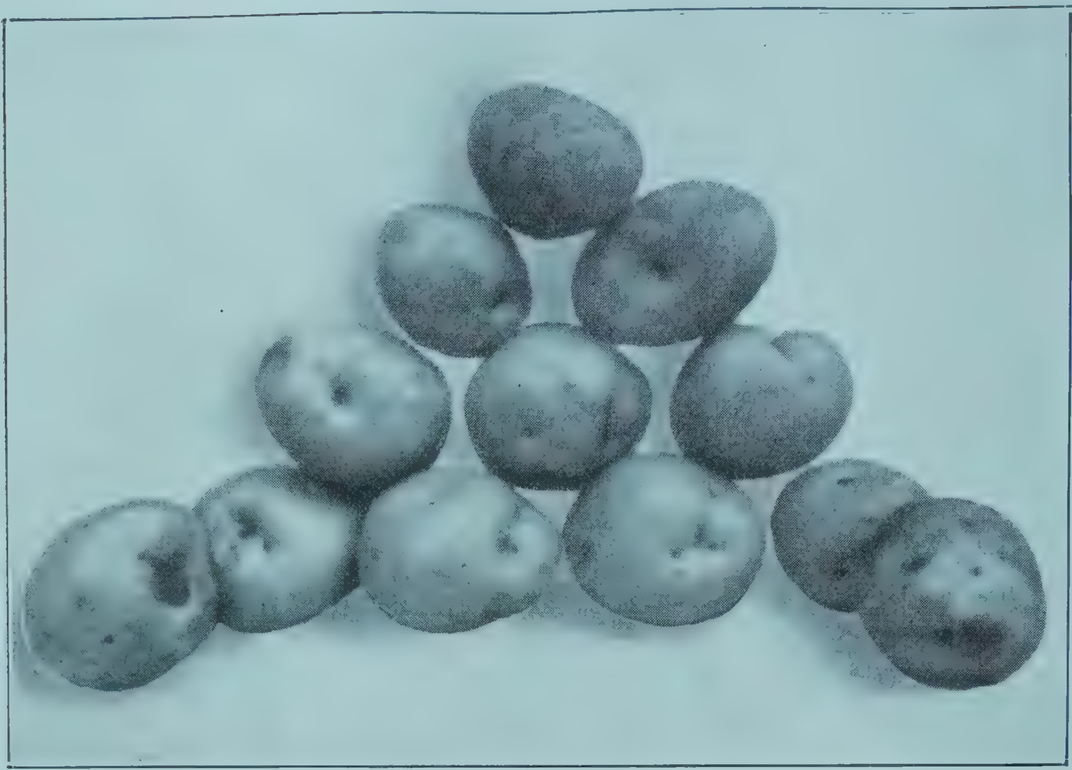


PLATE 27.—"SATISFACTION" POTATOES.
Produced under very dry weather conditions. From Mr. George Harvey's Farm, South Kolan.

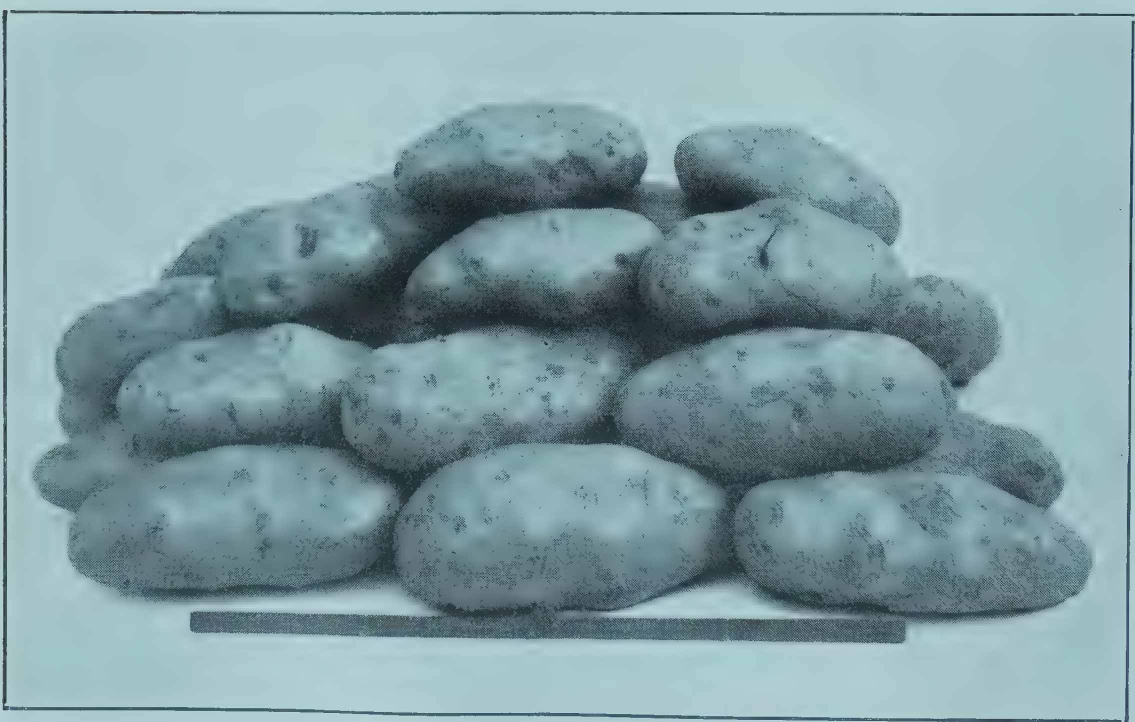
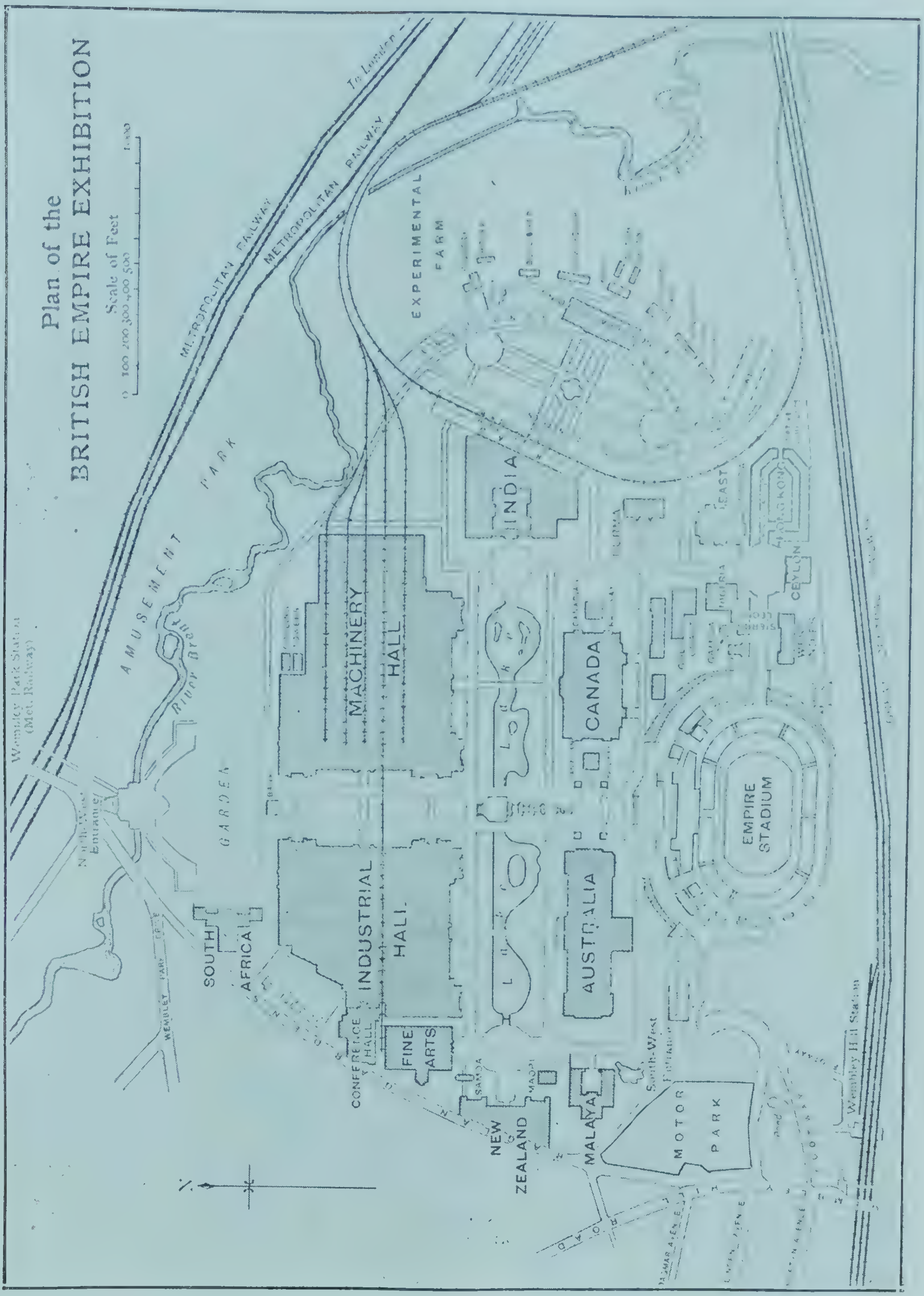


PLATE 28.—A FINE DISPLAY OF "DELAWARES."
Produced from Seed supplied by the Council of Agriculture and from which phenomenal returns have been recorded.


Plan of the
BRITISH EMPIRE EXHIBITION
Scale of Feet
METROPOLITAN RAILWAY
METROPOLITAN RAILWAY
To London
AMUSEMENT PARK
GARDEN
River Brent
Wembley Park Station (Met. Railway)
EXPERIMENTAL FARM
MACHINERY HALL
INDUSTRIAL HALL
INDIA
BURMA
CANADA
AUSTRALIA
EMPIRE STADIUM
CEYLON
FINE ARTS
CONFERENCE HALL
SOUTH AFRICA
NEW ZEALAND
MALAYA
South-West Entrance
MOTOR PARK
Wembley Hill Station

Answers to Correspondents.

Unemployed Workers' Insurance.

C.M. (Grandchester)—

The Act came into force on 1st March of this year. Deduct threepence from employee's wages each week and add the same amount as your own contribution. Unemployment cards and stamps (for covering the combined weekly contribution) may be obtained from the local Clerk of Petty Sessions. Farmers are not under an Arbitration Court award, consequently no minimum wage has been fixed.

Hide Tanning.

J.R.C. (Goranba)—

All vessels used in connection with tanning operations should be of wooden or other non-metallic substances.

Hides may be tanned either freshly flayed or in a salted condition, but stored hides should be kept from heating.

To dehair hides, take 6 to 8 lb. of freshly burnt lime in a half barrel and gradually slake; when slaked add up to 2 gallons of water. Shake the hide to remove all salt, trim thoroughly, and, if of large size, split down the back to facilitate handling. Soak hide flesh side out in clean water, suspending the hide on sticks for two or three hours, stirring frequently. After soaking, lay them on a beam, hair side up, scrape and scrub well; reverse and remove all flesh and fat. Scrape well with the back of a butcher's knife; resoak. Green hides require twelve to fourteen hours, and salted hides twenty-four to forty-eight; scrape again with a butcher's knife. A ''beam'' consists of a piece of timber about 2 feet wide and 8 feet long, planed and placed in a sloping position from waist high to about 12 inches above the ground.

Place lime water prepared as above in the barrel previously used for soaking the hide and nearly fill with water. Immerse the hides in this till the hair will rub off easily with the palm of the hand. Keep the solution frequently stirred and covered.

Place the hide on the beam and scrape off all hair; if sufficiently soaked a cheesy or curdy layer will rub off with the hair. Scrape flesh side as well to remove as much lime as possible.

Soak the hide in a barrel of water to which has been added 9 oz. of 22 per cent. tannery lactic acid or half a gallon of vinegar. Soak for twenty-four hours; wash with clean water and soak over night.

The tanning solution should be prepared fifteen or twenty days before the actual operation. Take 30 to 40 lb. finely ground wattle or mangrove bark to 20 gallons of hot water, cover and stir frequently. Strain liquor into the barrel and add water to nearly fill it; add 2 quarts vinegar. Soak hides in this solution, stirring and moving them frequently.

Prepare a second lot of tanning solution in the same manner, and when the hides have coloured nicely remove 5 gallons of the old tan and substitute 5 gallons of the new tan and add another 2 quarts of vinegar. Repeat this operation every five days, omitting the vinegar. After thirty-five days add 30 to 40 lb. fine ground bark moistened with hot water, stirring well in order to cover the hides with bark.

After six weeks' soaking with continual stirring, half empty the barrel and fill up with finely ground bark. After two months the hide should be thoroughly tanned.

Rinse and rub out all the tan water with a stiff brush and ''slicker''; the latter is a piece of brass 6 inches by 4 inches let into a piece of wood along one edge, and is used in a similar manner to that of a scraper. When the hide is damp, but not wet, coat well with neatsfoot or cod oil. Hang up and let dry slowly. When dry, damp again and apply a mixture of tallow and neatsfoot, in equal parts; boil and apply warm. Dry the hides and sprinkle with sawdust to remove any oiliness.

Scale Ailment in Fowls.

The poultry instructor (Mr. J. Beard) advises the following treatment for a scale ailment in fowls caused by a minute parasite which burrows under and about the scales of a bird's legs:—

Wash the legs thoroughly and allow them to dry. Mix 1 lb. of lard, ½ lb. of sulphur, and ¼ lb. of boracic acid. Warm it over a slow fire, and, when cooling, add a little kerosene, and stir well. One good rubbing of this mixture into the legs should be quite sufficient for most cases. This mixture can be made in less quantity proportionately. All the perches should be thoroughly washed with boiling water, and, when dry, painted with kerosene or wood-preserving oil.

Kapok.

W.A.J.H. (Grantham)—

Information, compiled by the Government Botanist (Mr. C. T. White, F.L.S.), was published in this Journal for September, 1921.

Bulletin No. 26, "The Kapok Industry," by Murad M. Saleeby, issued by the Bureau of Agriculture, Government of the Phillipine Islands, Manila, contains the fuller information you seek, but space limitations precludes its reprinting in the Journal. Natural conditions for its propagation are, however, not entirely favourable in your district, and no doubt you would find cotton-growing a better commercial proposition. If, however, you still require seeds or cuttings for experimental purposes, write to the Curator, Botanic Gardens, Rockhampton.

Greasy Heel.

The Chief Inspector of Stock (Major A. H. Cory), replying to a correspondent, advises that it would appear from the information given about a horse, that the swelling in the fetlock joints is due to the greasy heels. In such cases it is necessary to treat the animal internally as well as externally. A purgative drench consisting of 5 drachms Barbadoes aloes, dissolved in one pint hot water, should be given. This drench must be allowed to cool before being administered. When this has operated, the following powder should be given daily in food: Powdered sulphur, ½ oz.; saltpetre, 2 drachms; black antimony, 5 grains. The affected heels should be dressed twice daily with sulphate of zinc and acetate of lead, equal parts. Those drugs, if rubbed well together, will form a paste, which should be applied to the affected part. Upon no account should water be applied to the greasy heels, as this retards the curative action of the drugs mentioned.

Tobacco in the Stanthorpe District.

"TOBACCO" (Stanthorpe)—

It is suggested that you obtain small quantities, say ¼ oz. each, of "Blue Pryor," "Broadleaf Gooch," "White Burleigh," and "White Orinoco" tobacco seed for trial. Frost will, of course, have to be guarded against. Select a well-drained, weed-free area carrying light friable soil with subsoil underlying at a depth of from 12 to 18 inches—a clay having a proportion of sand incorporated with it. Stanthorpe soil, generally, requires fertilising. Use, say, a complete manure containing 4 to 5 per cent. water or citrate soluble phosphoric acid, 5 per cent. nitrogen, and 8 to 10 per cent. potash as sulphate. Texture, aroma, and burning qualities of the leaf are influenced by the character of the manure used. Rank, coarse, organic manures and also manures containing chlorides should be avoided. Fertilisers should be freely used, and quantities of 6 to 10 per cent. per acre have proved profitable in some tobacco-growing areas. A new edition of the departmental pamphlet on tobacco-growing is now in the printer's hands, and will be available shortly for distribution.

THE SWEET POTATO *(Ipomœa Batatas).*

By G. B. BROOKS, Instructor in Agriculture.

In tropical and sub-tropical areas, probably no other crop is so universally cultivated as the sweet potato. In many countries, such as Mexico, Central and South America, the sweet potato is the principal article of diet, while in the United States of America, South Africa, India, China, Japan, South Sea Islands, New Zealand, and Australia, it is more or less extensively grown.

In Queensland, although not raised on a large scale as a market crop, practically every farmer has his sweet potato patch.

ORIGIN.

While authorities differ as to the exact country of origin, it is generally agreed that it is either American or Asiatic. De Candolle, in "The Origin of Cultivated Plants," gives the opinion that it is a native of China, it being mentioned in the oldest work on medicine—that of the Emperor Shen-Ming.

Captain Cook, in his first voyage round the world in 1760, discovered the sweet potato growing in Tahiti, and in the following year found that it was largely raised in New Zealand.

The present-day vernacular in the different countries is of interest, as the names given suggest a place of common origin. The old Chinese potato was known as "chu," the introduced as "au-chu." In India we have "Mita-Alu," "Shine-Alu" being the white form, and "Shakarand-Alu" the red variety. In Tahiti it is called "Kumara," in the South Sea Islands "Umara," in Central America "Cumar." In Japan it is known as "Kara-Zimo," in Peru as "Skirrets," and in South Africa "Veeazee." In the United States and Australia the only name applied is sweet potato.

VARIETIES.

Probably in no other crop grown is there so much confusion in regard to names of varieties as in the case of sweet potato. Farmers who may have quite a number of sorts under cultivation, very rarely know them by name. Many growers invariably call all white varieties "Maltese," and all red ones "Rosella." While collecting specimens for classification purposes, I invariably found that different names were given to a similar variety in the different districts.

The importance of the crop certainly warrants that some order should be introduced into the existing chaos. The writer some two years ago undertook the task of unravelling the tangle, not only to make the nomenclature of the varieties uniform, but to ascertain those most suitable for stock feeding, culinary use, and starch production, together with their behaviour under different types of soils and climatic conditions.

My duties as Instructor in Agriculture facilitated the collecting of specimens, which were obtained from the agricultural areas visited, also from adjacent islands and the Southern States, together with a number of American varieties.

PROPAGATION.

In order to facilitate the work of classification, it was essential that the varieties should be under close observation during the various stages of growth. A portion of land adjacent to my residence was utilized for propagation purposes. This permitted the compilation of data at periods that did not interfere with my duties as Instructor.

To ensure purity of type, the propagation of each variety was carried out from a single tuber. As the vines became available, cuttings were planted out under field conditions on the farm of Mr. A. E. Fisher, Gracemere, so that the necessary information could be obtained in regard to habits of growth, yield, &c. The varieties under observation numbered fifty. Several duplicates had previously been discarded.

Owing to the dry conditions prevailing at this time—no useful rain falling until the middle of January—the season was of thus too short duration to permit the full development of the crop, more particularly late maturing sorts. Reliable data as to early and late maturing habits, yields, &c., were therefore not obtainable. Arrangements were made, however, to again grow all varieties, together with several additions in the propagation bed, and also to carry out comparative tests in a number of districts where there was a considerable variation in soils and climatic conditions.

The field classification plot was on this occasion located on the farm of Mr. S. G. Hoare, Alton Downs, the soil being a very heavy close-textured basalt.

As already mentioned, the original propagation plot consisted of one tuber of each variety. In laying down the plot for the following season's operations, approximately, one half-hundredweight of selected tubers of each sort was used. These produced a fine crop of vines, over 30,000 cuttings being distributed during the season.

CLASSIFICATION.

A good deal of consideration was given to compiling a classification key which would enable growers to easily identify varieties from the formula set out. It was intended that the description should only embrace such well-defined characteristics as shape of leaf, colour of skin and flesh of tuber; but when put into practice it was found that the characters mentioned were not sufficient to separate certain varieties, consequently additional factors had to be included, making the key of a more elaborate nature.

It will be seen that the method of classification adopted is that usually applied in regard to plant nomenclature. The characters chosen are, with one or two exceptions, easy of observation, commencing with the leaf-size, shape, &c., and following on with the stem, colour of tuber, flesh, habit of growth, early, culinary qualities, feeding value, yield, &c.

Several experimentalists in America have attempted to classify the varieties into groups, according to the shape of the leaves alone. This method, however, I found to be quite impracticable, as some sorts invariably show certain variation in type.

The key evolved by Dr. H. A. B. Groth, of the University of Pennsylvania, embraces some thirty-six characteristics. The order in which those are detailed have to some extent been followed in this instance; but, being limited exclusively to characters necessary to classification, and as the chief objective in taking up this work was the improvement of the crop, a much more comprehensive key had to be elaborated, the inclusion of factors such as culinary qualities, maturing habit, yield, starch contents, feeding value, &c., being absolutely essential.

DISTINGUISHING CHARACTERISTICS.

Several authorities consider that the shape of the leaf alone is sufficient to distinguish all varieties, dividing them into three groups, viz.:—cut, round and lobed, or shouldered. It is certainly not difficult to tell a cut from a round-leaf variety, but, unfortunately, there is a considerable variation in the round and shouldered class, according to climatic conditions and period of growth. The size of the leaf in a well-grown plant is probably less variable than the shape. The colour of the leaf is a valuable aid in separating some of the varieties, more particularly during the early stages of growth. There are several shades of green represented—light, olive, and dark. In a number of sorts the young leaves are of a distinct purple; others have a purple tip, while some are light-green, with purple edge.

A number of crossbred seedlings have been raised. Of the first crop the seeds produced were, with one exception, dark-brown or black in colour. The exception was black and white, in about equal proportions. From this was raised a seedling, the tubers of which, on being planted, gave respectively leaves all green, variegated green and white, and pure white.

A very prominent characteristic in some varieties is the purple star on the upper portion of the leaf, where the veins spring from the petiole or leaf stalk.

The colouration of the midrib and other large veins is an easy manner of distinguishing between varieties. In some, the veins are green, while in others it varies from a faint pink to a deep purple.

Pubescence.—In regard to the presence or absence of hairs, I have found that this characteristic is somewhat variable. Many varieties during the early stages of growth, more particularly when it is rapid, have both leaves and stem covered with fine hairs, which disappear later on. In some, the stems are covered with stiff hairs throughout the whole period of growth.

Stem.—The length and also the thickness of stem is a very definite character, the variation between respective varieties, even under different climatic conditions, being fairly constant. The colour of the stem is also a distinguishing feature, the shades represented varying from a uniform green, green with purple marks around the base of the leaf stalk, deep purple, and purplish-green.

There are also thin, or fine-stemmed, and thick heavy-stemmed varieties.

Tubers.—There are several characteristics connected with this part of the plant that are of much importance in the scheme of classification, such as colour of outside or skin of tuber, colour of flesh, distinctness of wood bundles in starch, dryness or texture of flesh when cooked, taste or flavour, size, shape, and more particularly the manner in which the tubers are attached to the plant—whether bunch or spreading, early or late maturing, yield, starch content, and feeding qualities.

Outside Colour.—In several varieties the outside colour varies according to the period of growth, and to a certain extent upon the type of soil in which they are grown. For instance, in the early stages of growth some are a distinct pink; others are of a pinkish tinge, but on reaching maturity the colour will be a deep yellow. Unfortunately, a number of sorts are described by growers as being white, while as a matter of fact they are either cream or yellow.

Colour of Flesh.—The colour of the flesh is a fairly constant characteristic, and much more reliable for distinguishing types than the colour of the outside skin. There are quite a variety of shades to be met with, ranging from a greyish or slatey white to white, pale yellow, golden-yellow, orange, pink, orange mottled with pink and with purple.

Wood or Fibre Bundles.—The presence of wood bundles, their colour, and the manner in which they are grouped, are distinctive features, and play an important part in classification. In several varieties those fibre bundles are not visible.

Culinary Qualities.—Owing to the difference of opinion as to the characteristics that should be embodied in a good table variety, I found some difficulty in fixing a standard of excellence. To numerous enquiries made as to what type was most desirable, the answer invariably given was, "a white, dry, mealy sort." This statement was not quite in accordance with fact, however, for when supplied with a white mealy potato and a rather soft, yellow, good flavoured one, the latter was preferred. An American authority, writing on this subject, says that "in the South the wet sugary varieties are preferred. Some sorts boil soft, but when baked are most delicious."

The type of soil, together with climatic conditions, has an important bearing in regard to edible quality. Some of the slow-growing medium-sized varieties can be harvested for table use at a very early stage of growth; others that grow rapidly to a large size are generally soft and watery, improving, however, later in the season, when the vines are checked in growth, either through cold or dry conditions. Which of the varieties are most suitable for cooking early in the season can be ascertained by cutting a tuber and discarding those in which the latex or milky exudation rapidly turns a dark colour.

Habit of Growth of Tubers—Bunch or Spreading.—This is a very distinctive characteristic, and is an easy means of separating varieties that are otherwise similar in type. In some sorts the tubers are bunched together close to the stem, while in others they are attached by underground runners which vary in length from a few inches to over a foot. The bunch type have invariably long tubers, which in some instances

project through the surface of the soil to the extent of several inches—an undesirable feature, as they are thus more liable to the attack of the sweet potato weevil or borer. In those of a spreading habit the tubers are mostly oblong or round.

Early and Late Maturing Habit.—This character is rather indefinite, owing to the fact that the crop does not mature or ripen in a well-defined manner such as the English potato, maize, or wheat, the period of growth usually extending to the advent of low temperature or frost. Analyses made of several varieties at two periods of growth—early July and late in August—when cut down by frost, were of considerable interest, in that it showed in some instances a decrease in starch in the late-harvested tubers which had grown in the interval to about double the size they were when first tested. For example, Mammoth Cattle gave in the first test 18·91 starch, and later 12·40.

The type of vine has often a considerable influence both in regard to growth and yield. Cuttings from a strong, robust variety like Ruby will establish themselves much more readily under adverse conditions than those from a soft, thin-stemmed sort, such as Small-stem Jersey, which, if exposed to a hot sun immediately after planting out, will burn off close to the soil.

Cropping Qualities.—Comparative tests carried out in several districts have demonstrated that there is considerable variation in the cropping qualities of the respective varieties. There was only one place where all varieties were grown together—viz., on the stud plot at Alton Downs. In order that a strict comparison should be made, the weights given are from the crop harvested there. The soil was of a heavy, black basaltic nature, a type not generally recognised at being suitable for sweet potato culture. The conditions were extremely dry for several weeks after planting out the cuttings, and on two occasions the crop was reported as being practically a failure, but rain came just in time to keep the plants alive. Most of the growth was made during the early winter months. Individual varieties gave much heavier yields in districts where the season was more favourable.

Now that the work of classification is well in hand, comparative tests will be carried out in districts where a considerable variation will be met with, both in regard to climate and soil, so that the best varieties for local conditions can be ascertained.

Starch Content and Feeding Value.—As the composition of the tuber is of the greatest importance, all available varieties growing on the stud plot were submitted to the agricultural chemist (Mr. J. C. Brünnich) for analysis. The tubers were all obtained from one centre—viz., the stud plot at Alton Downs. The results, which appear in the accompanying table, are most interesting, varieties analysed showing a wide variation in both starch and protein content. The variety showing the highest starch content is Vitamine, with 24·27, the average of all varieties tested being 17·79. Had the season been more favourable, this would undoubtedly have been higher. Very little rain fell at Alton Downs until

late in the summer; consequently the period of growth was very short—much too short, in fact, for the late-maturing sorts.

PROPAGATION OF NEW VARIETIES.

The propagation of the sweet potato crop has been carried out probably for centuries, principally by cuttings taken from the vine or stem; and, as little or no attention has been given to selection as a means of improvement, it is a rather remarkable fact that the varieties grown have retained to such an extent their vitality and comparative freedom from disease.

That a certain amount of deterioration has taken place in various districts is evident from the numerous requests that have come to hand for vine cuttings, with the explanation that their plants have run out. The vines, although growing profusely, do not produce tubers.

In addition to the collecting and classification of existing varieties, which have been grown from specially selected tubers, the work of raising new varieties from seed was also taken in hand.

The seed was secured from those growing in the propagating bed. Approximately six crops of vine cuttings were removed during the summer, and it was in the subsequent growth that was allowed to stand over the winter that blooms appeared. It was found that although several sorts flowered very freely, no seed was produced. It was thought that in all probability the flowers might not be fertile to their own pollen, so recourse was made to cross-fertilization. This proved to be effective, as practically all the flowers so treated produced fertile seed.

The flower borne on a 3 to 4-inch footstalk was bell-shaped, of a pinkish colour outside and a purplish blue inside. The stamens are a little longer than the style, and produce a fairly plentiful supply of pollen. East flower produces one to three seeds, which are enclosed in a round, brown-coloured capsule, which is very brittle and in size about that of a small garden pea. The seeds vary in colour from a light brown to a dead black. It was noted that in one instance the seeds obtained from a cross between Mammoth Cattle and Giant Gindie were black and white, about equally divided in cross-section.

The precaution was taken to sprout all seeds before putting them in the soil, germination invariably taking about three weeks. The seedlings are rather delicate during the early stages of growth. The leaves are of the characteristic sweet potato shape, both cut and round, shouldered being also represented.

From the black and white seeds a plant resulted having green, white and green, and white leaves. The small tubers, on being planted, produced vines with all-green leaves, with green and white leaves, and with pure ivory-white leaves, with the stem a delicate pink.

So far, the only variety that has shown a tendency to sport is Ruby. In Ruby the leaf is round and smooth that of the variation long and shouldered, with rough crinkled surface, somewhat similar in type to the English potato.

TABLE OF ANALYSES OF VARIETIES.

Variety.	Water.	Starch.	Other Carbohydrates.	Fibre.	Proteins.	Fat.	Ash.	Dry Starch.	Tons per Acre Stud Plot.
Aromatic	79·10	10·10	7·10	0·69	1·61	0·15	1·25	48·17	6·19
Abundance	70·60	15·56	9·15	0·66	2·75	0·22	1·05	53·52	5·50
Acme	64·00	22·72	9·11	0·87	2·05	0·26	0·99	63·20	4·60
Alton Downs Red ..	75·40	13·30	..	0·76	1·50	0·17	0·88	..	5·80
Boyne River ..	69·00	19·43	7·32	0·85	2·06	0·29	1·05	62·68	16·16
Brooks's Gem ..	56·00	21·74	7·95	0·78	2·34	0·21	0·98	63·95	28·00
Bon Accord.. ..	70·40	19·33	6·44	0·67	2·09	0·14	0·93	65·30	27·12
Big Bunge	68·90	19·64	6·80	0·86	2·46	0·24	1·10	53·16	24·20
Capricorn	68·30	17·89	11·24	0·95	0·50	0·33	0·79	56·44	14·13
Cook's Favourite ..	64·70	20·83	9·90	0·84	2·49	0·22	1·02	59·06	17·12
College Eclipse ..	75·60	14·82	6·00	0·78	1·50	0·28	1·02	60·72	30·90
Captain Page ..	66·30	19·30	10·5	0·84	1·75	0·27	1·01	57·38	10·15
Director	53·40	23·00	10·44	0·88	1·14	0·32	0·82	52·87	30·40
Don River	75·80	15·25	..	0·68	1·70	0·16	0·91	..	27·12
Emerald	77·40	13·28	6·10	0·75	1·50	0·19	0·78	58·74	19·13
Farmers' Special ..	63·40	24·10	7·84	0·89	2·56	0·27	0·94	65·82	17·50
Golden Casket ..	64·50	23·00	7·84	0·89	2·49	0·19	1·99	64·83	11·12
Golden Nugget ..	78·60	12·21	5·42	0·67	1·83	0·14	1·13	57·06	15·90
Homehill	75·20	13·75	7·76	0·66	1·52	0·15	0·96	55·45	29·50
Hermitage	70·70	17·92	7·66	0·77	1·78	0·21	0·96	61·96	14·40
Impd. Long Bunch	71·90	17·96	6·44	0·86	1·63	0·22	0·99	64·26	24·20
Kairi	71·20	17·19	9·07	0·86	1·59	0·15	0·92	59·57	11·14
Mammoth Cattle ..	68·90	18·91	8·34	0·79	1·75	0·28	1·03	60·80	35·11
Matchless	69·40	17·94	9·00	0·82	1·61	0·20	1·03	58·62	28·17
Prospector	73·90	15·69	6·50	0·75	2·06	0·17	0·93	60·10	28·00
Pink Rambler ..	72·80	18·96	4·61	0·62	1·94	0·14	0·93	69·70	12·00
Ruby	65·80	20·00	10·76	0·91	1·41	0·36	0·76	58·58	26·90
Russell Island ..	75·30	14·76	6·20	0·90	1·75	0·18	0·91	59·76	32·70
Record	68·80	20·90	6·86	0·77	1·62	0·16	0·89	67·00	18·11
Rumsey's Yellow ..	76·10	12·85	7·41	0·92	1·44	0·32	0·96	53·77	10·15
Royal Purple ..	73·20	15·88	7·13	0·79	1·78	0·24	0·98	59·24	21·12
Snow Queen ..	71·90	17·39	6·84	0·78	1·96	0·23	0·90	61·88	17·50
Star of Warren ..	66·20	19·70	10·32	0·72	1·94	0·22	0·90	58·30	10·60
Springfield Prolific..	73·10	16·46	6·58	0·74	2·17	0·17	0·78	61·18	21·40
Star of Queensland	69·10	18·70	8·10	0·88	2·03	0·20	0·99	60·52	4·60
Sokkar	78·90	11·37	5·76	0·63	1·98	0·13	0·93	55·33	5·50
Superfine	67·10	22·00	6·44	0·88	2·19	0·30	1·09	66·92	15·10
Vitamine	62·90	24·27	9·41	0·97	1·20	0·33	0·92	65·43	15·90
White Australia ..	77·30	14·00	5·53	0·69	1·44	0·19	0·85	61·76	25·00
White Kumura ..	78·50	11·72	6·56	0·76	1·44	0·15	0·87	54·50	25·18
Yellow Fitzroy ..	72·00	17·23	6·23	0·81	2·44	0·18	1·11	61·53	17·50
Averages ..	70·80	17·79	7·56	0·81	1·85	0·22	0·97	60·84	20·86
Maxima ..	79·10	24·27	11·24	0·97	2·76	0·36	1·25	69·70	35·11
Minima ..	62·90	10·10	4·61	0·62	0·50	0·13	0·78	48·17	4·00

Average Yield per Acre for 5 Highest Yielding Varieties	31·07
Average Yield per Acre for 10 Highest Yielding Varieties	29·47
Average Yield per Acre for 20 Highest Yielding Varieties	22·25
Average Yield per Acre for 44 Highest Yielding Varieties	20·86

CLASSIFICATION KEY FOR SWEET POTATO VARIETIES.

A. Shape of Leaf—
1. Cut.
2. Round. 2A Frilled.
3. Long. 3A Shouldered.
4. Broad. 4A Shouldered.
5. Mixed.

B. Size of Leaf—
1. Small—Less than 4 in. across.
2. Large—More than 4 in. across.

C. Length of Stem—
1. Short—Less than 6 feet.
2. Medium—6 to 12 feet.
3. Long—12 to 18 feet.
4. Extra long—Over 18 feet.

D. Colour of Stem—
1. Green.
2. Green, with purple around axil of leaves.
3. Greenish-brown to purple.
4. Purple.

E. Size of Stem—
1. Thin—Less than $\frac{1}{8}$ inch in diameter.
2. Thick—More than $\frac{1}{8}$ inch in diameter.

F. Presence of Star—
1. Star present.
2. Star absent.

G. Colour of Lower Surface of Veins—
1. Veins purple.
2. Midrib pinkish.
3. Purple spot at base of leaves.
4. Veins all green.

H. Arrangement of Hairs on Leaf, &c.—
1. Hairs all over.
2. Chiefly marginal, and along veins. 2A. On stem.
3. Marginal only.
4. Absent.

I. Outside Colour of Tuber—
1. White. 1A. Pinkish.
2. Yellow. 2A. Golden. 2B. Bronze.
3. Yellowish-red. 3A. Pinkish.
4. Red. 4A. Purple.

J. Colour of the Flesh of Tubers—
1. White. 1A Yellowish-white.
2. Cream coloured, 2A Golden-yellow.
3. Pinkish-yellow. 3A Greenish-yellow.
4. Pink-orange.
5. Marked with purple.

K. Distinctness of Wood Elements in Tuber—
1. Distinct.
2. Blurred.
3. Not visible.

L. Maturing Habit—
1. Early.
2. Medium.
3. Late.

M. Cropping Qualities—
1. Light—under 10 tons.
2. Good—10 to 20 tons.
3. Heavy—over 20 tons.

N. Culinary Qualities—
1. Good flavour boiled. 1 A. Baked.
2. Poor flavour boiled. 2A. Baked.
3. Dry cooker. 3A. Medium dry.
4. Moist Cooker.

O. Habit of Growth (Arrangement of Tubers on Stem)—
1. Bunch.
2. Medium.
3. Spreading.

AROMATIC.

KEY. A 4A B 1 C 3 D 2–3 E 1 F 1 G 1 H 2A I 4 J 4 K 2 L 1 M 1 N 2–4 O 1.

DESCRIPTION—

Leaf.—Broad, shouldered ; young foliage purple ; mature leaves purplish edge ; veins purple ; star present.

Stem.—Long ; thin ; greenish-brown to purple.

Tuber.—Medium long ; large ; colour red ; flesh pink-orange.

Cooking Qualities.—Moist ; peculiar aromatic flavour.

Habit of Growth.—Tubers bunched.

Maturing Habit.—Early.

Cropping Qualities.—Rather poor.

Composition.—Starch very low, 10·10 ; protein, 1·61.

ABUNDANCE.

KEY. A 3A B 1 C 1 D 1 E 1 F 2 G 4 H 1 I 4 J 2A K 1 L 3 M 1 N 1–4 O 1.

DESCRIPTION—

Leaf.—Small ; long ; shouldered ; veins all green ; star absent.

Stem.—Short ; thin ; green colour.

Tuber.—Small ; medium long ; red colour ; flesh deep cream.

Cooking Qualities.—Moist cooker ; flavour good.

Habit of Growth.—Very bunched ; producing a large number of small tubers having fine fibrous roots.

Maturing Habit.—Very late.

Cropping Qualities.—So far, poor, probably due to late planting.

Composition.—Starch contents fair, 15·56 ; protein, 2·76.

ACME.

KEY. A 2–3 B 1 C 3 D 1 E 2 F 1 G 3 H 3 I 1A J 1 K 2 L 3 M 2 N 2–4 O 1.

DESCRIPTION—

Leaf.—Small ; round ; veins green ; purple spot at base of leaf.

Stem.—Thick ; long ; green colour.

Tubers.—Medium-size ; round ; yellowish-white colour ; flesh white.

Cooking Qualities.—Moist cooker ; fair flavour.

Habit of Growth.—Bunched.

Maturing Habit.—Late.

Cropping Qualities.—Poor in heavy soil, good in sandy loam.

Composition.—Starch good—22·72 ; protein, 2·05.

ALTON DOWNS RED.

KEY. A 3A B 1 C 2 D 2–3 E 1 F 1 G 1 H 4 I 4 J 2 K 2 L 3 M 1 N 1–3 O 1.

DESCRIPTION—

Leaf.—Small ; long ; shouldered ; veins purple ; star present.

Stem.—Medium long, thin ; green, with deep purple patches at axil of leaf.

Tuber.—Elongated ; small ; red colour ; flesh deep cream.

Culinary Qualities.—Medium dry, good flavour.

Habit of Growth.—Bunched.

Maturing Habit.—Late season.

Cropping Qualities.—Light ; one crop test only.

Composition.—Starch low—13·30 ; protein, 1·50.

BOYNE RIVER.

KEY. A 1 B 2 C 1 D 2 E 2 F 1 G 1 H 3 I 2 J 1A K 1 L 1 M 2 N 1–3 O 2.

DESCRIPTION—

Leaf.—Large ; cut type ; veins purple ; star present.

Stem.—Short ; thick ; green, with purple spot at axil of leaf.

Tuber.—Large ; pear-shaped ; yellow skin ; flesh white.

Culinary Qualities.—Dry ; good flavour.

Habit of Growth.—Medium bunch.

Maturing Habit.—Early season.

Cropping Qualities.—Good.

Composition.—Starch, 19·43 ; protein, 2·06.

BROOKS'S GEM.

Key. A 2 B 2 C 2 D 2 E 2 F 1 G 1 H 2 I 2 J 1 K 1 L 2 M 3 N 1–3 O 1.

Description—

Leaf.—Large; fan-shaped; very distinct frill; veins purple; star present.

Stem.—Medium long; thick; green colour; purple spot at axil of leaf.

Tuber.—Elongated; skin yellow; flesh white.

Culinary Qualities.—Dry cooker; good flavour.

Habit of Growth.—Bunchy.

Maturing Habit.—Mid-season.

Cropping Qualities.—Excellent.

Composition.—Starch good, 21·74; protein, 2·34.

BON ACCORD.

Key. A 2 B 1 C 4 D 4 E 1 F 2 G 2 H 1 I 3A J 3 K 2 L 1 M 3 N 3–1 O 3.

Description—

Leaf.—Long; shouldered; mid-rib pinkish.

Stem.—Extra long; thin; purple.

Tuber.—Very large; round, ribbed surface; flesh pinkish-yellow.

Culinary Qualities.—Dry; good flavour.

Habit of Growth.—Spreading.

Maturing Habit.—Early.

Cropping Qualities.—Heavy.

Composition.—Starch, 19·33; protein, 2·09.

BIG BUNGE.

Key. A 2–4 B 1 C 1 D 2 E 1 F 1 G 1 H 1 I 2 J 3 K 1 L 1 M 2 N 1–3 O 2.

Description—

Leaf.—Small; broad; veins purple; star present.

Stem.—Short; thin; green, with purple spots at axil of leaf.

Tuber.—Large pear-shaped; medium smooth surface; colour yellow; flesh pinkish-yellow.

Culinary Qualities.—Dry; good flavour.

Habit of Growth.—Tubers medium spreading.

Maturing Habit.—Early.

Cropping Qualities.—Good.

Composition.—Starch, 19·64; protein, 2·46.

BIG STEM YELLOW.

Key. A 3 B 1 C 2 D 1 E 1 F 2 G 3 H 1 I 2 J 2 K 1 L 3 M 2 N 2–4 O 2.

Description—

Lea .—Long; veins green, with purple spot at base of leaf; star absent.

Stem.—Long; thin; green colour.

Tuber.—Medium size; egg-shaped; yellow skin; flesh cream colour.

Culinary Qualities.—Moist cooker; fair flavour.

Habit of Growth.—Medium bunch.

Maturing Habit.—Late season.

Cropping Qualities.—Medium.

Composition.—Not yet determined.

BLANCIA (AMERICAN VARIETY).

KEY. A 3 B 2 C 3 D 4 E 2 F 1 G 2 H 1 I 1 J 1 K L M N O.

DESCRIPTION—

Leaf.—Large ; round ; toothed ; some shouldered ; veins pinkish ; star present.

Stem.—Long ; vigorous ; purple colour ; tips green ; medium thick.

Tuber.—Flesh white ; not sufficiently matured for further classification.

CAPRICORN.

KEY. A 4A B 1 C 2 D 2 E 2 F 2 G 1 H 4 I 2A–3A J 1 K 2 L 3 M 2 N 1–4 O 3.

DESCRIPTION—

Leaf.—Small ; shouldered ; mid-rib pinkish.

Stem.—Medium long ; thick ; green, with purple spot at axil of leaf.

Tuber.—Short ; ribbed surface ; golden-yellow ; pinkish-cream flesh.

Culinary Qualities.—Moist cooker ; good flavour.

Habit of Growth.—Tubers medium spreading.

Maturing Habit.—Mid-season.

Cropping Qualities.—Good.

Composition.—Starch, 17·89 ; protein low, 0·50.

COOK'S FAVOURITE.

KEY. A 2 B 2 C 1 D 2 E 2 F 1 G 1 H 1 I 2A J 2 K 1 L 2 M 2 N 1–3A O 3.

DESCRIPTION—

Leaf.—Round ; slightly shouldered and toothed ; veins purple ; star present.

Stem.—Short ; thick ; green, with purple patch at axil of leaf.

Tuber.—Round, with smooth surface ; yellow skin ; flesh mottled ; pinkish-cream.

Culinary Qualities.—Medium dry ; excellent flavour.

Habit of Growth.—Tubers spreading.

Maturing Habit.—Mid-season.

Cropping Qualities.—Good.

Composition.—Starch, 20·83 ; protein, 2·49.

Good table variety. Similar in type to Big Bunge, Star of Warren, and Yellow Fitzroy.

COLLEGE ECLIPSE.

KEY. A 2 B 1 C 2 D 1 E 2 F 2 G 4 H 2A I 2 J 1 K 1 L 1 M 2 N 2–4 O 3.

DESCRIPTION—

Leaf.—Round ; medium-size ; veins and midrib green ; star absent.

Stem.—Medium length ; green.

Tuber.—Large ; tapering ; yellow colour ; flesh white.

Culinary Qualities.—Moist cooker ; poor flavour.

Habit of Growth.—Very spreading.

Maturing Habit.—Early.

Cropping Qualities.—Excellent.

Composition.—Starch low, 14·82 ; protein, 1·50.

Good stock variety.

CAPTAIN PAGE.

KEY. A 3A B 1 C 2 D 4 E 1 F 2 G 1 H 1 I 3A J 4 K 3 L 1 M 2 N 3–1 O 2–3.

DESCRIPTION—

Leaf.—Long ; medium size ; veins and margin of leaf purple.
Stem.—Medium length ; thin, purple, and hairy.
Tuber.—Medium round to pear-shaped ; yellow colour, with pinkish tip ; flesh pinkish-yellow.
Culinary Qualities.—Dry ; good flavour.
Habit of Growth.—Medium spreading.
Maturing Habit.—Early.
Cropping Qualities.—Fair.
Composition.—Starch good, 19·30 ; protein, 1·25.

DIRECTOR.

KEY. A 2 B 2 C 2 D 2 E 2 F 1 G 1 H 4 I 2 J 1 K 1 L 1 M 3 N 1–3 O 1.

DESCRIPTION—

Leaf.—Large ; broad ; shouldered ; veins purple ; star present.
Stem.—Medium length ; thick ; green, with purple patch at base of leaf.
Tuber.—Large ; long ; tapering ; yellow skin ; flesh white.
Culinary Qualities.—Dry ; good flavour.
Habit of Growth.—Bunchy.
Maturing Habit.—Early.
Cropping Qualities.—Excellent.
Composition.—Starch very good, 23·00 ; protein, 1·14.
A variety very suitable to sandy loam soil.

DON RIVER.

KEY. A 3A B 1 C 3 D 1 E 2 F 1 G 3 H 3 I 1–2—J 1 K 2 L 3 M 2 N 2–3 O 2.

DESCRIPTION—

Leaf.—Medium size ; wide ; shouldered ; veins green ; purple spot at base of leaf.
Stem.—Long ; thick ; green in colour.
Tuber.—Very large ; pear-shaped ; yellowish-white colour ; flesh white ; pink eyes.
Culinary Qualities.—Moist cooker ; fair flavour.
Habit of Growth.—Medium bunch.
Maturing Habit.—Late.
Cropping Qualities.—Excellent.
Composition.—Starch, 15·25 ; protein, 1·70.

EMERALD.

KEY. A 4A B 2 C 2 D 2 E 2 F 2 G 2 H 4 I 2A J 1 K 2 L 2 M 1 N 1A–4 O 2–3.

DESCRIPTION—

Leaf.—Large ; broad ; shouldered ; midrib pinkish ; star absent.
Stem.—Medium thick ; green, with purple spot at axil of leaf.
Tuber.—Medium size ; long ; tapering ; yellow skin ; flesh white.
Culinary Qualities.—Moist if boiled ; good table variety if baked.
Habit of Growth.—Medium spreading.
Maturing Habit.—Mid-season.
Cropping Qualities.—Good.
Composition.—Starch low, 13·28 ; protein, 1·50.

FARMERS' SPECIAL.

KEY. A 3 B 1 C 2 D 2 E 1 F 1 G 1 H 2 I 2 J 1A K 2 L 3 M 1
N 1A–4A O 1.

DESCRIPTION—

Leaf.—Long ; veins purple ; star present.
Stem.—Medium length ; thin ; green, with purple patch at axil of leaf.
Tuber.—Small, long, tapering ; skin yellow ; flesh pale yellow.
Culinary Qualities.—Rather moist ; good table variety if baked.
Habit of Growth.—Very bunchy, projecting on surface of soil.
Maturing Habit.—Late.
Cropping Qualities.—Good.
Composition.—Starch excellent, 24·10 ; protein very good, 2·56.

FLOURBALL.

KEY. A 1 B 2 C 2 D 2 E 2 F 1 G 1 H 3 I 2 J 1 K 1 L 2
M 2 N 1–3A O 1.

DESCRIPTION—

Leaf.—Large ; cut-shape ; veins purple ; star present.
Stem.—Medium length, thick ; green, with purple patch at axil of leaf.
Tuber.—Small, elongated ; yellow skin ; flesh white.
Culinary Qualities.—Excellent.
Habit of Growth.—Bunch.
Maturing Habit.—Very late season.
Cropping Qualities.—Light.
Composition.—Not yet determined.

GOLDEN CASKET.

KEY. A 2 B 2 C 1 D 2 E 1 F 1 G 1 H 1 I 2 J 2A K 1 L 2
M 2 N 1A–3A O 3.

DESCRIPTION—

Leaf.—Round, toothed ; veins purple ; star present ; hairy all over.
Stem.—Short ; thin ; green, with purple patch at axil of leaf.
Tuber.—Medium size ; round ; skin yellow ; flesh golden-yellow, pinkish markings ; very distinct ring.
Culinary Qualities.—Very good baked ; rather soft boiled.
Habit of Growth.—Spreading.
Maturing Habit.—Mid-season.
Cropping Qualities.—Fair.
Composition.—Starch good, 23·00 ; protein high, 2·49.

GOLDEN NUGGET.

KEY. A 3A B 2 C 3 D 4 E 2 F 2 G 3–4 H 2 I 3A–4 J 2A K 1
L 1 M 2 N 1–3 O 3.

DESCRIPTION—

Leaf.—Long, shouldered, large ; veins green ; star absent ; purple patch at base of leaf.
Stem.—Long, thick ; purple colour.
Tuber.—Small, round ; smooth surface ; skin pinkish-yellow ; flesh golden-yellow.
Culinary Qualities.—Good flavour ; dry cooker ; bakes well.
Habit of Growth.—Spreading.
Maturing Habit.—Early.
Cropping Qualities.—Good.
Composition.—Starch low, 12·21 ; protein, 1·83.

GIANT GINDIE.

KEY. A 3A B 1 C 2 D 2 E 1 F 1 G 1 H 2A I 1 J 1 K 1 L 1 M 1 N 2–4 O 2–3.

DESCRIPTION—

Leaf.—Round, small ; veins purple ; star present.

Stem.—Thin, medium length ; green, with purple patch at base of leaf.

Tuber.—Large, tapering ; ribbed surface ; skin white ; flesh white.

Culinary Qualities.—Moist cooker ; poor flavour.

Habit of Growth.—Medium spreading.

Maturing Habit.—Early.

Cropping Qualities.—Good.

Composition.—Not yet determined.

Good variety for stock use.

HOMEHILL—

KEY. A 4A B 1 C 2 D 2 E 2 F 2 G 2–3 H 4 I 3A J 2 K 2 L 2 M 2 N 2–4 O 1.

DESCRIPTION—

Leaf.—Broad, shouldered ; medium size ; veins green ; star absent.

Stem.—Short, thick ; green, with purple around axil of leaf.

Tuber.—Very large ; slightly tapering ; yellow ; white flesh.

Culinary Qualities.—Moist cooker ; poor flavour.

Habit of Growth.—Spreading.

Maturing Habit.—Early.

Cropping Qualities.—Very good.

Composition.—Starch low, 13·75 ; protein, 1·52.

Good variety for stock use.

HERMITAGE.

KEY. A 4A B 1 C 2 D 2 E 2 F 2 G 2–3 H 4 I 3A J 2 K 2 L 2 M 2 N 2–4 O 1.

DESCRIPTION—

Leaf.—Broad, shouldered ; medium size ; midrib pinkish ; purple at base of leaf.

Stem.—Medium length ; thick ; green, with purple patch at axil of leaf.

Tuber.—Small ; medium long ; cream ; flesh pinkish-yellow.

Culinary Qualities.—Moist cooker ; rather poor flavour.

Habit of Growth.—Bunched.

Maturing Habit.—Mid-season.

Cropping Qualities.—Fair.

Composition.—Starch good, 17·92 ; protein, 1·18.

IMPROVED LONG BUNCH.

KEY. A 1 B 2 C 2 D 2 E 2 F 1 G 1 H 4 I 2 J 1 K 1 L 2 M 3 N 1–3 O 1.

DESCRIPTION—

Leaf.—Long, cut, large ; veins purple ; star present.

Stem.—Medium length, thick ; green, with purple patch at base of leaf.

Tuber.—Very long ; medium size ; yellow colour ; flesh white.

Culinary Qualities.—Dry cooker ; good flavour.

Habit of Growth.—Bunched.

Maturing Habit.—Mid-season.

Cropping Qualities.—Good.

Composition.—Starch good, 17·95 ; protein, 1·63.

KAIRI.

KEY. A 2–3 B 2 C 2 D 1 E 2 F 2 G 4 H 4 I 3A J 2 K 2 L 1 M 2 N 1–3 O 2.

DESCRIPTION—

Leaf.—Large, long ; veins all green ; star absent.

Stem.—Medium length, thick ; green colour.

Tuber.—Small ; slightly tapering ; very distinctive deep-ribbed rough surface ; colour pinkish-yellow ; flesh white.

Culinary Qualities.—Dry cooker ; good flavour.

Habit of Growth.—Medium bunch.

Maturing Habit.—Early.

Cropping Qualities.—Fair.

Composition.—Starch good, 17·19 ; protein, 1·59.

MAMMOTH CATTLE.

KEY. A 3A B 2 C 2 D 1 E 1 F 2 G 4 H 2 I 3A J 1 K 3 L 1 M 3 N 1–3A O 2.

DESCRIPTION—

Leaf.—Medium size ; long ; shouldered ; veins green ; star absent.

Stem.—Medium length ; thin ; green colour.

Tuber.—Very large ; pear-shaped ; ribbed ; yellowish white-pink tinge in depression ; flesh white.

Culinary Qualities.—Dry cooker ; good flavour.

Habit of Growth.—Medium bunch.

Maturing Habit.—Early.

Cropping Qualities.—Excellent.

Composition.—Starch good, 18·91 ; protein, 1·75.

Excellent variety for stock use.

MATCHLESS.

KEY. A 3 B 2 C 2 D 1 E 2 F 1 G 2 H 1 I 3A J 1 K 2 L 1 M 2 N 1–3 O 1.

DESCRIPTION—

Leaf.—Round ; long ; mid-rib pinkish ; star present.

Stem.—Medium length ; thick ; green.

Tuber.—Large ; tapering ends ; slightly ribbed ; pinkish-yellow colour ; flesh white.

Culinary Qualities.—Dry cooker ; good flavour.

Habit of Growth.—Very spreading.

Maturing Habit.—Early.

Cropping Qualities.—Good.

Composition.—Starch good, 17·94 ; protein, 1·61.

MAMMY.

KEY. A 2 B 2 C 3 D 1 E 2 F 2 G 3 H 1 I 2 J 1 K L M N O.

DESCRIPTION—

Leaf.—Very large ; heart-shaped ; veins green ; star absent.

Stem.—Long, thick ; green in colour.

Tuber.—Pinkish-yellow flesh ; not sufficiently matured for classification.

American variety.

NANCY HALL.

KEY. A 3A B 2 C 2 D 3 E 2 F 2 G 4 H 4 I J K L M N O.

DESCRIPTION—

Leaf.—Very large ; toothed ; veins green ; star absent.

Stem.—Medium length ; thick ; very robust ; olive-green colour.

Tuber.—Not sufficiently matured for classification.

American variety.

PROSPECTOR.

Key. A 3 B 1 C 2 D 4 E 1 F 1 G 3 H 3 I 2 J 2 K 1 L 2 M 2 N 1a–3a O 2.

Description—

Leaf.—Long, round, large ; veins green ; purple patch at base of leaf.
Stem.—Thin ; medium length ; purple in colour.
Tuber.—Large ; bright yellow in colour ; flesh cream.
Culinary Qualities.—Dry cooker ; good flavour.
Habit of Growth.—Spreading.
Maturing Habit.—Mid-season.
Cropping Qualities.—Very good.
Composition.—Starch fair, 15·69 ; protein high, 2·06.

PINK RAMBLER.

Key. A 3a B 2 C 3 D 4 E 2 F 2 G 3 H 2 I 3a J 2 K 1 L 2 M 2 N 1–3a O 3.

Description—

Leaf.—Long ; shouldered ; large ; light green-purple spot at base of leaf ; star absent.
Stem.—Thick ; very long ; purple colour.
Tuber.—Medium size ; egg-shaped ; pinkish-yellow colour ; flesh cream.
Culinary Qualities.—Medium dry cooker ; good flavour.
Habit of Growth.—Medium spreading.
Maturing Habit.—Mid-season.
Cropping Qualities.—Fair.
Composition.—Starch good, 18·96 ; protein, 1·94.
Good variety to grow as a smother crop for weeds.

RUBY.

Key. A 2 B 2 C 2 D 1 E 2 F 1 G 4 H 2a I 4a J 1 K 1 L 1 M 3 N 1–3a O 1.

Description—

Leaf.—Round, large ; veins green ; midrib pinkish ; star present.
Stem.—Medium length ; thick ; green in colour.
Tuber.—Large, medium length ; rough skin ; purple colour ; flesh white ; often fissured.
Culinary Qualities.—Very dry ; good flavour ; fibrous when old.
Habit of Growth.—Bunched.
Maturing Habit.—Early.
Cropping Qualities.—Good.
Composition.—Starch good, 20·00 ; protein, 1·41.
Good all-round variety ; grows to a large size in sandy loam soil.

RUSSELL ISLAND.

Key. A 3 B 1 C 2 D 2 E 2 F 1 G 4 H 4 I 2 J 1 K 1 L 3 M 2 N 2–4 O 2.

Description—

Leaf.—Long ; sometimes shouldered ; large ; veins green ; star present.
Stem.—Medium length ; thick ; green, with purple patch at base of leaf.
Tuber.—Large ; long ; round ends ; yellow colour ; flesh white ; fibre bundles very distinct yellow.
Culinary Qualities.—Boils soft ; bakes well.
Habit of Growth.—Medium bunch.
Maturing Habit.—Mid-season.
Cropping Qualities.—Very good.
Composition.—Starch low, 14·76 ; protein, 1·75.
Good all-round stock variety.

RECORD.

KEY. A 3 B 2 C 2 D 1 E 1 F 2 G1–4 H 3 I 3 J 1 K 2 L 1 M 2 N 3A–1 O 2.

DESCRIPTION—

Leaf.—Long ; large ; veins green ; midrib pinkish ; star absent.

Stem.—Medium length ; thick ; green in colour.

Tuber.—Rather small ; pear-shaped ; pinkish-yellow in colour ; flesh white.

Culinary Qualities.—Dry cooker ; good flavour.

Habit of Growth.—Spreading.

Maturing Habit.—Very early.

Cropping qualities.—Good.

Composition.—Starch good, 20·90 ; protein, 1·70.

RUMSEY'S YELLOW.

KEY. A 2 B 2 C 2 D 2 E 1 F 1 G 2 H 2 I 2 J 2 K 2 L 1 M 1 N 2–4 O 3.

DESCRIPTION—

Leaf.—Round ; large ; veins midrib pinkish ; star present.

Stem.—Medium length ; thin ; colour green, with purple patch at base of leaf.

Tuber.—Medium size ; elongated ; pinkish-white colour ; flesh cream.

Culinary Qualities.—Boils soft ; rather poor flavour.

Habit of Growth.—Spreading.

Maturing Habit.—Early.

Cropping Qualities.—Rather poor ; only one test carried out.

Composition.—Starch low, 12·85 ; protein, 1·44.

ROYAL PURPLE.

KEY. A 3A B 1 C 2 D 2 E 1 F 2 G 1 H 3 I 2B J 3 K 2 L 1 M 2 N 2–4 O 2.

DESCRIPTION—

Leaf.—Long ; sometimes slightly shouldered ; veins purple ; star abse

Stem.—Medium long ; thin ; colour green, with purple patch at base of leaf.

Tuber.—Medium size ; long ; round ends ; bronze colour ; flesh pinkish-white.

Culinary Qualities.—Moist cooker ; rather poor flavour.

Habit of Growth.—Medium bunch.

Maturing Habit.—Early.

Cropping Qualities.—Good.

Composition.—Starch rather low, 15·88 ; protein, 1·78.

SNOW QUEEN.

KEY. A 1 B 2 C 2 D 2 E 2 F 1 G 1 H 2 I 2 J 1 K 1 L 2 M 2 N 1–3 O 1.

DESCRIPTION—

Leaf.—Cut, large ; veins purple ; star present.

Stem.—Medium long, thick ; colour green, with purple patch at base of leaf.

Tuber.—Medium size, very long ; yellow colour ; flesh white.

Culinary Qualities.—Boils dry ; fine flavour.

Habit of Growth.—Bunch.

Maturing Habit.—Mid-season.

Composition.—Starch good, 17·39 ; protein, 1·96.

Variety known in several localities as W. Maltese and Madagascar.

STAR OF WARREN.

KEY. A 2 B 2 C 1 D 2 E 2 F 1 G 1 H 1 I 2 J 2A K 3 L 2 M 2 N 1–3A O 3.

DESCRIPTION—

Leaf.—Round ; toothed ; veins purple ; star present.

Stem.—Short, thick ; green, with purple patch at base of leaf.

Tuber.—Round ; smooth, even surface ; rather small ; yellow colour flesh light-cream ; fibre bundles forming distinct pattern.

Culinary Qualities.—Dry cooker ; good flavour ; bakes well.

Habit of Growth.—Very spreading.

Maturing Habit.—Mid-season.

Cropping Qualities.—Fair.

Composition.—Starch good, 19·70 ; protein, 1·94.

Very good table variety.

SPRINGFIELD PROLIFIC.

KEY. A 3 B 2 C 2 D 2 E 2 F 1 G 1 H 2A I 2 J 1A K 1 L 2 M 2 N 1A–4A O 1.

DESCRIPTION—

Leaf.—Long, large ; veins purple ; star present.

Stem.—Medium length ; thick ; green, with purple patch at axil of leaf.

Tuber.—Medium length ; tapering ; fair size ; colour yellow ; flesh light-cream.

Culinary Qualities.—Medium dry ; bakes well ; good flavour.

Habit of Growth.—Bunch.

Maturing Habit.—Mid-season.

Cropping Qualities.—Good.

Composition.—Starch fair, 16·46 ; protein high, 2·17.

STAR OF QUEENSLAND.

KEY. A 1 B 2 C 2 D 2 E 2 F 1 G 1 H 3 I 2 J 1 K 1 L 1 M 2 N 1–3 O 1.

DESCRIPTION—

Leaf.—Cut ; veins purple ; star present.

Stem.—Medium length ; thick ; colour green, with purple patch at axil of leaf.

Tuber.—Medium size ; tapering shape ; yellow ; numerous eyes, deeply indented ; flesh pinkish-yellow ; fibre bundles forming star.

Culinary Qualities.—Dry cooker ; good flavour.

Habit of Growth.—Bunch.

Maturing Habit.—Early.

Cropping Qualities.— Poor.

Composition.—Starch good, 18·70 ; protein high, 2·33

SOKKAR.

KEY. A 3A B 2 C 1 D 1 E 2 F 2 G 3 H 4 I 2 J 1 K 2 [L 2 M 2 N 2–4 O 2.

DESCRIPTION—

Leaf.—Cut ; large ; veins green ; purple spot at base of leaf ; star absent.

Stem.—Short ; thick ; green colour.

Tuber.—Small ; medium long ; usually deep fissured ; cream colour ; flesh yellow.

Culinary Qualities.—Boil soft ; sweetish taste ; sometimes attacked by ants.

Habit of Growth.—Medium spreading.

Maturing Habit.—Mid-season.

Cropping Qualities.—Fair.

Composition.—Starch low, 11·67 ; protein, 1·98.

Light frost kills vines completely.

SUPERFINE.

KEY. A 1 B 1 C 2 D 2 E 2 F 1 G 1 H 2 I 1–2 J 2A K 1 L 1 M 2 N 1–3 O 1.

DESCRIPTION—

Leaf.—Cut ; narrow ; long ; veins purple ; star present.

Stem.—Medium length ; thick ; green, with purple patch at base of leaf.

Tuber.—Very long ; medium size ; yellow skin and flesh.

Culinary Qualities.—Dry cooker ; excellent flavour.

Habit of Growth.—Bunch.

Maturing Habit.—Early.

Cropping Qualities.—Good.

Composition.—Starch very good, 22·00 ; protein, 2·19.

Excellent table sort.

SMALL STEM JERSEY.

KEY. A 3 B 1 C 1 D 1 E 1 F 2 G 4 H 1 I 2 J K L M N O.

DESCRIPTION—

Leaf.—Long ; small ; veins green.

Stem.—Vines short ; green colour.

Tuber.—Not sufficiently mature to determine characteristics.

VITAMINE.

KEY. A 1 B 2 C 2 D 2 E 2 F 1 G 1 H 2 I 2 J 1 K 1 L 2 M 2 N 1–3 O 1.

DESCRIPTION—

Leaf.—Cut ; large ; veins purple ; star present.

Stem.—Medium length ; thick ; purple patch at axil of leaf.

Tuber.—Large; slightly tapering ; yellow colour ; flesh light yellow.

Culinary Qualities.—Dry cooker; good flavour.

Habit of Growth.—Bunch.

Maturing Habit.—Mid-season.

Cropping Qualities.—Good.

Composition.—Starch highest of any variety so far tested, 24·27 ; protein, 1·20.

WHITE KUMURA.

KEY. A 2 B 2 C 2 D 3 E 2 F 1 G 1 H 4 I 2 J 2 K 1 L 1 M 1 N 1–3 O 1.

DESCRIPTION—

Leaf.—Large; round; veins purple; star present.

Stem.—Medium length; thick; greenish-brown to purple colour.

Tuber.—Large; ovoid shape; yellow; flesh white; wood fibres yellow.

Culinary Qualities.—Fair table variety, but better adapted for stock use.

Habit of Growth.—Bunch.

Maturing Habit.—Early.

Cropping Qualities.—Very good.

Composition.—Starch low, 11·22; protein, 1·44.

WHITE AUSTRALIA.

KEY. A 1 B 2 C 2 D 2 E 2 F 1 G 1 H 2A I 1 J 1 K 1 L 2 M 2 N 1–3 O 2.

DESCRIPTION—

Leaf.—Cut; large; veins purple; star present.

Stem.—Medium length; thick; green, with purple patch at axil of leaf.

Tuber.—Medium size; tapering; colour white; flesh white.

Culinary Qualities.—Dry cooker; good flavour.

Habit of Growth.—Medium spreading.

Maturing Habit.—Mid-season.

Cropping Qualities.—Good.

Composition.—Starch low, 14·00; protein, 1·44.

YELLOW FITZROY.

KEY. A 2 B 1 C 1 D 1 E 2 F 1 G 3 H 1 I 2 J 2A K 2 L 1 M 2 N 1A–3A O 2.

DESCRIPTION—

Leaf.—Round; small; toothed edge; veins green; purple spot at base of leaf.

Stem.—Short; thick; green colour.

Tuber.—Medium size; slightly tapering; yellow; cream flesh, with golden coloured ring.

Culinary Qualities.—Medium dry; bakes well; good flavour.

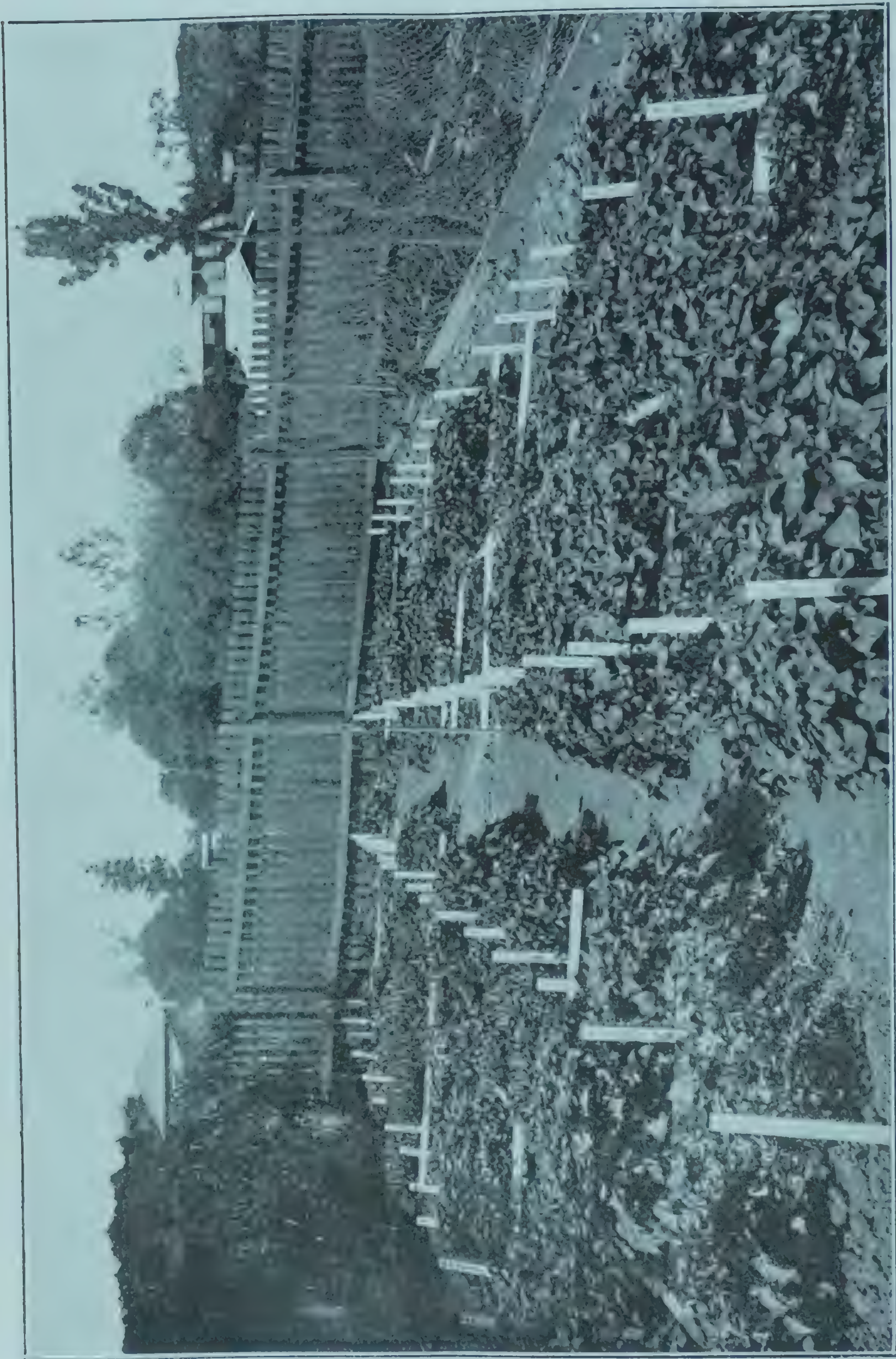
Habit of Growth.—Medium spreading.

Maturing Habit.—Early.

Cropping Qualities.—Good.

Composition.—Starch, 17·23; protein high, 2·44.

PLATE 1.

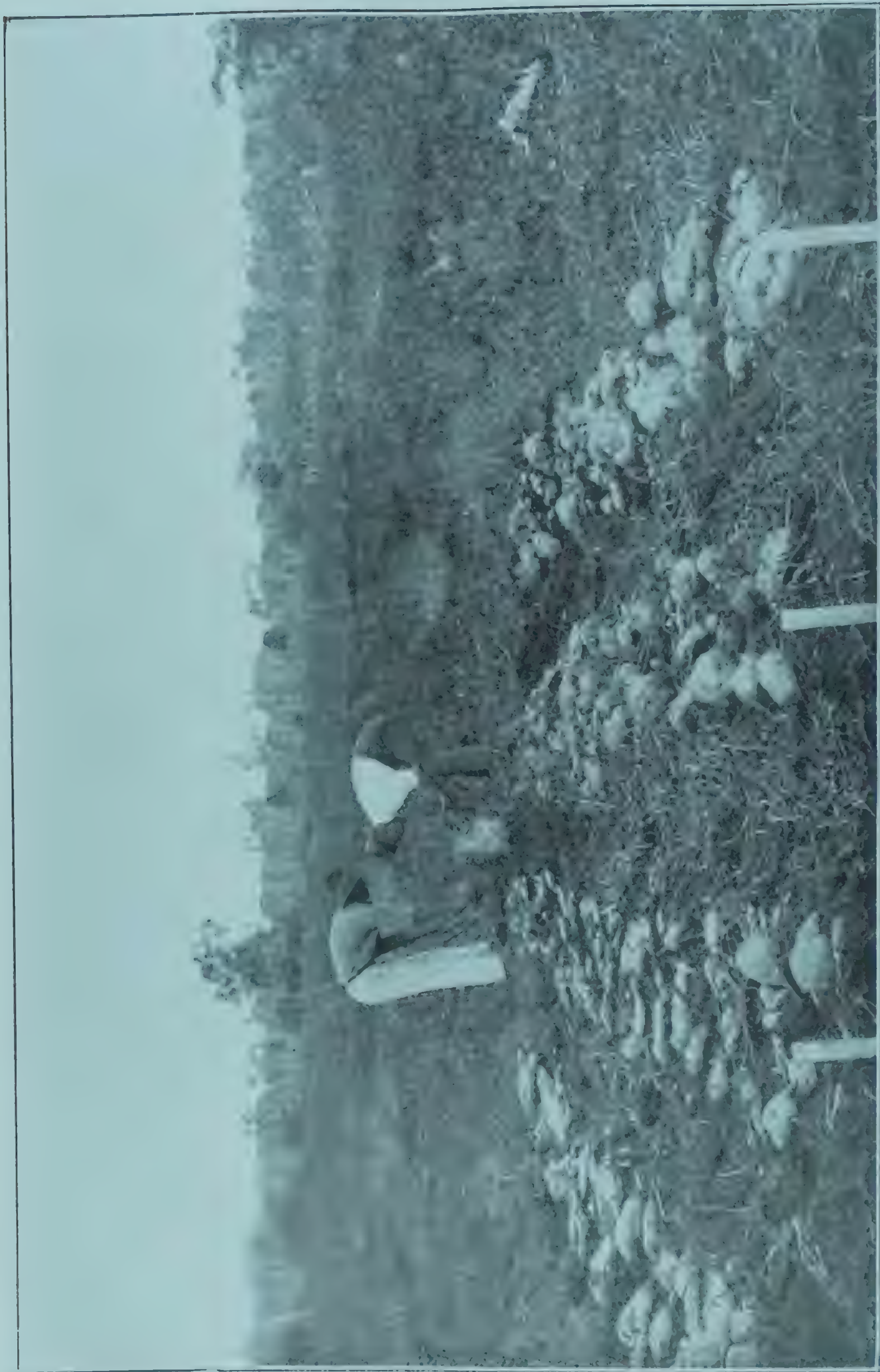


SWEET POTATO PROPAGATING BED.

PLATE 2.

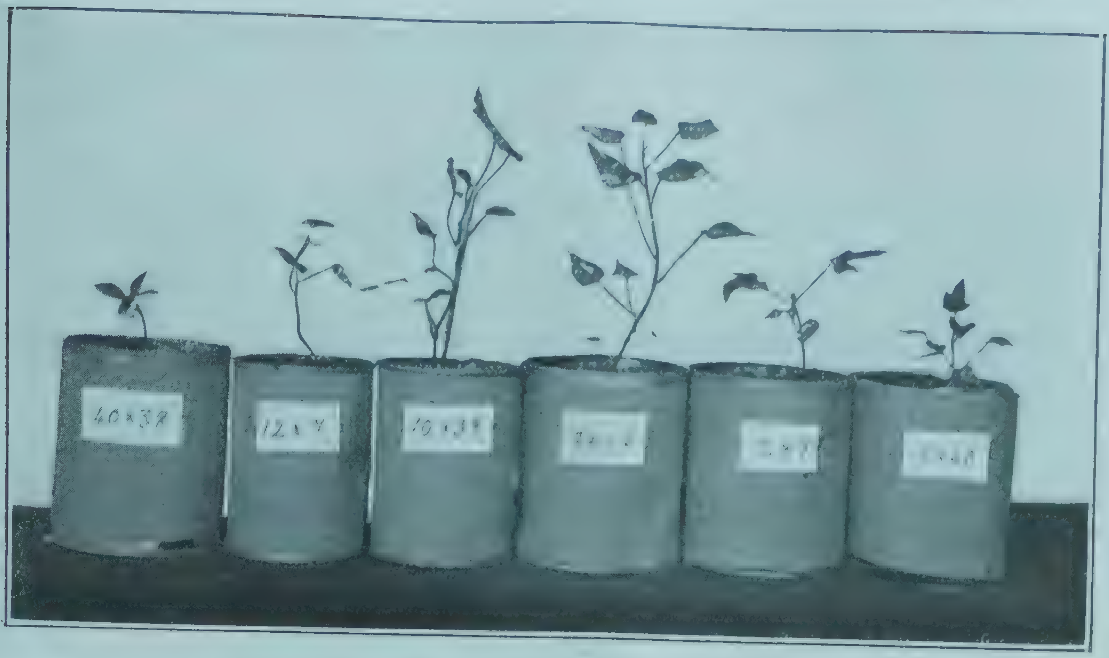
SWEET POTATO CLASSIFICATION PLOT.

PLATE 3.



ASCERTAINING YIELD PER ACRE.

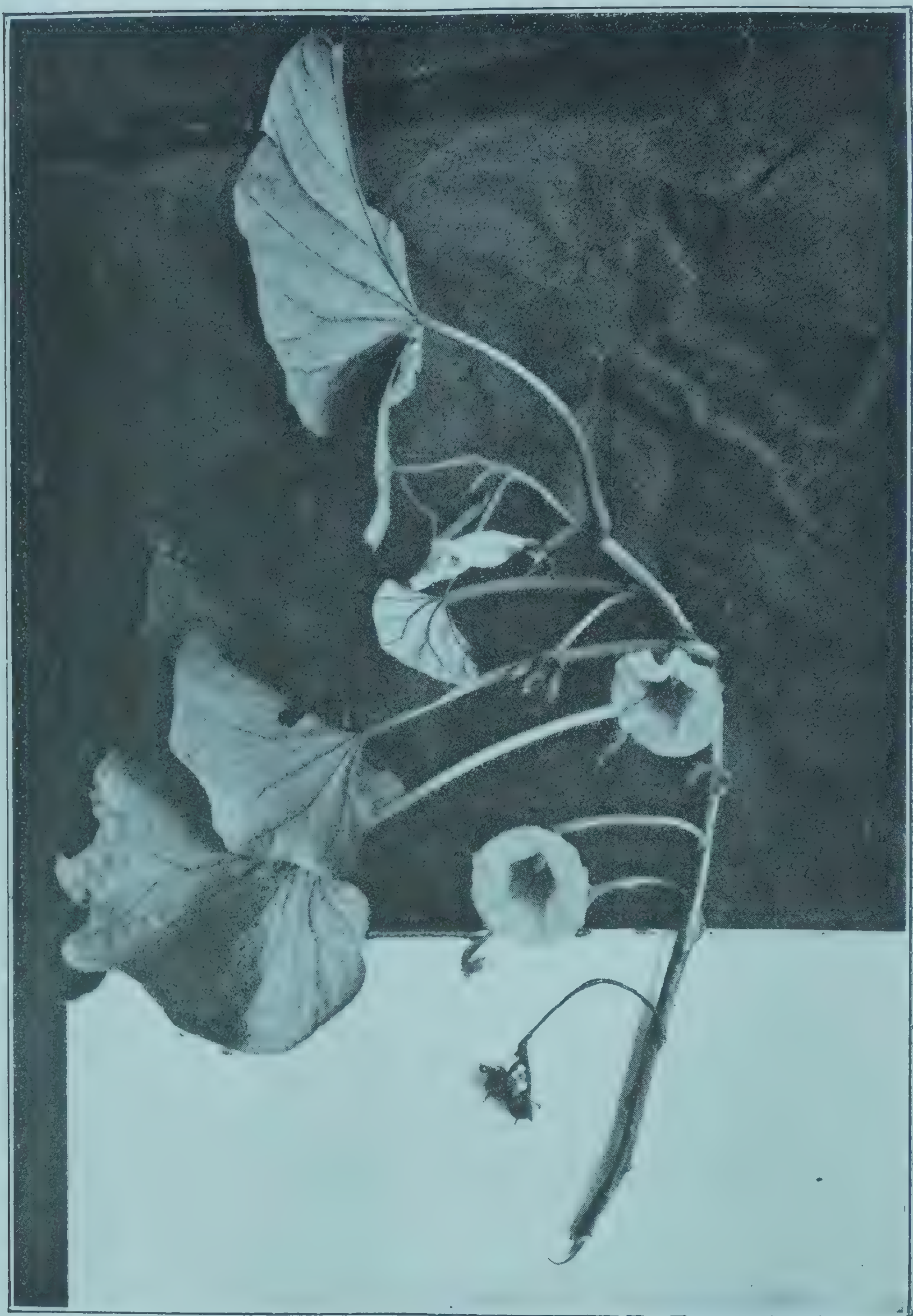
PLATE 4.



BATCH OF CROSSBRED SEEDLINGS

VARIETY WITH IVORY WHITE LEAVES.

PLATE 5.



FLOWER AND SEED OF SWEET POTATO.

PLATE 6.

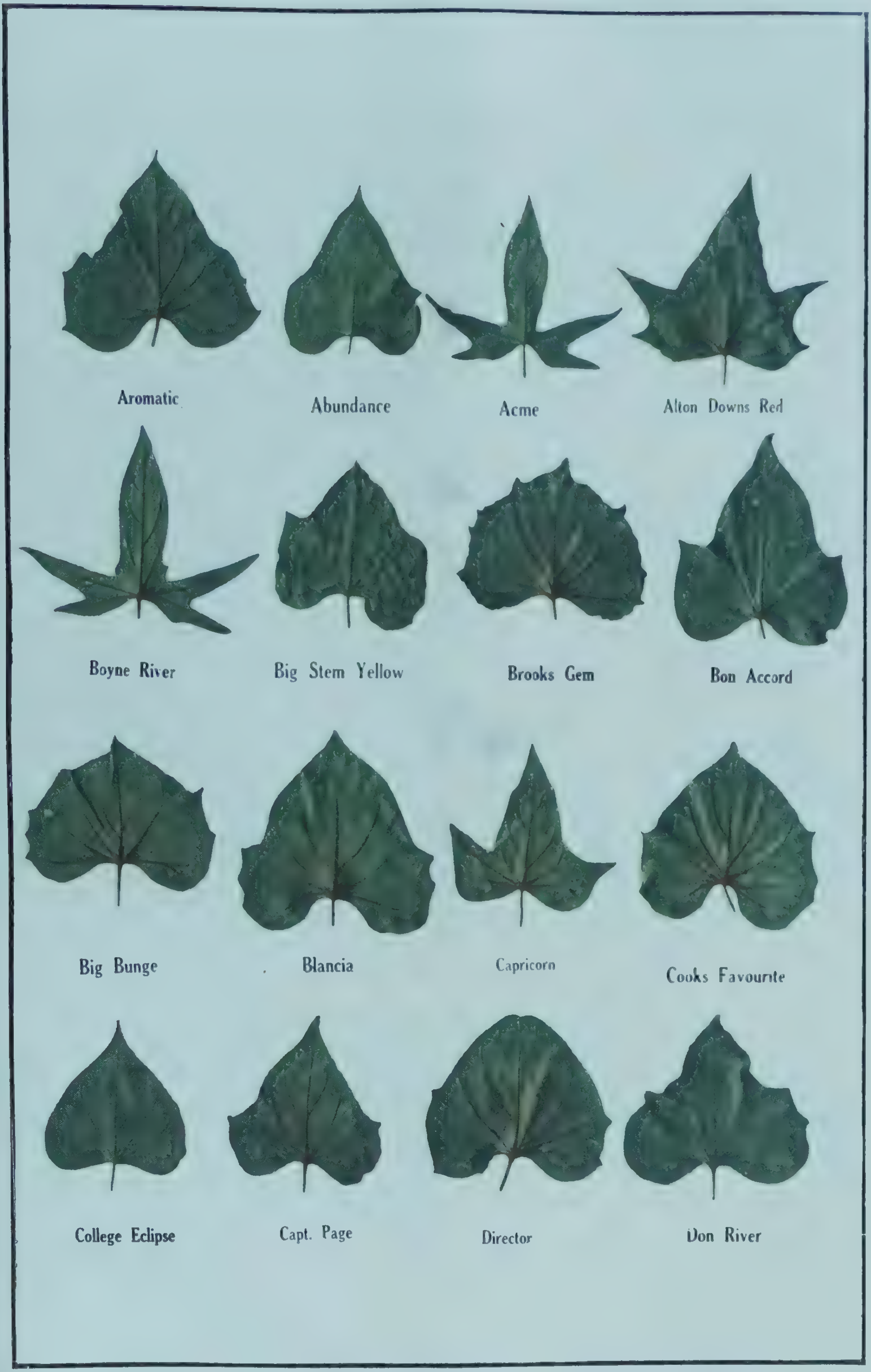
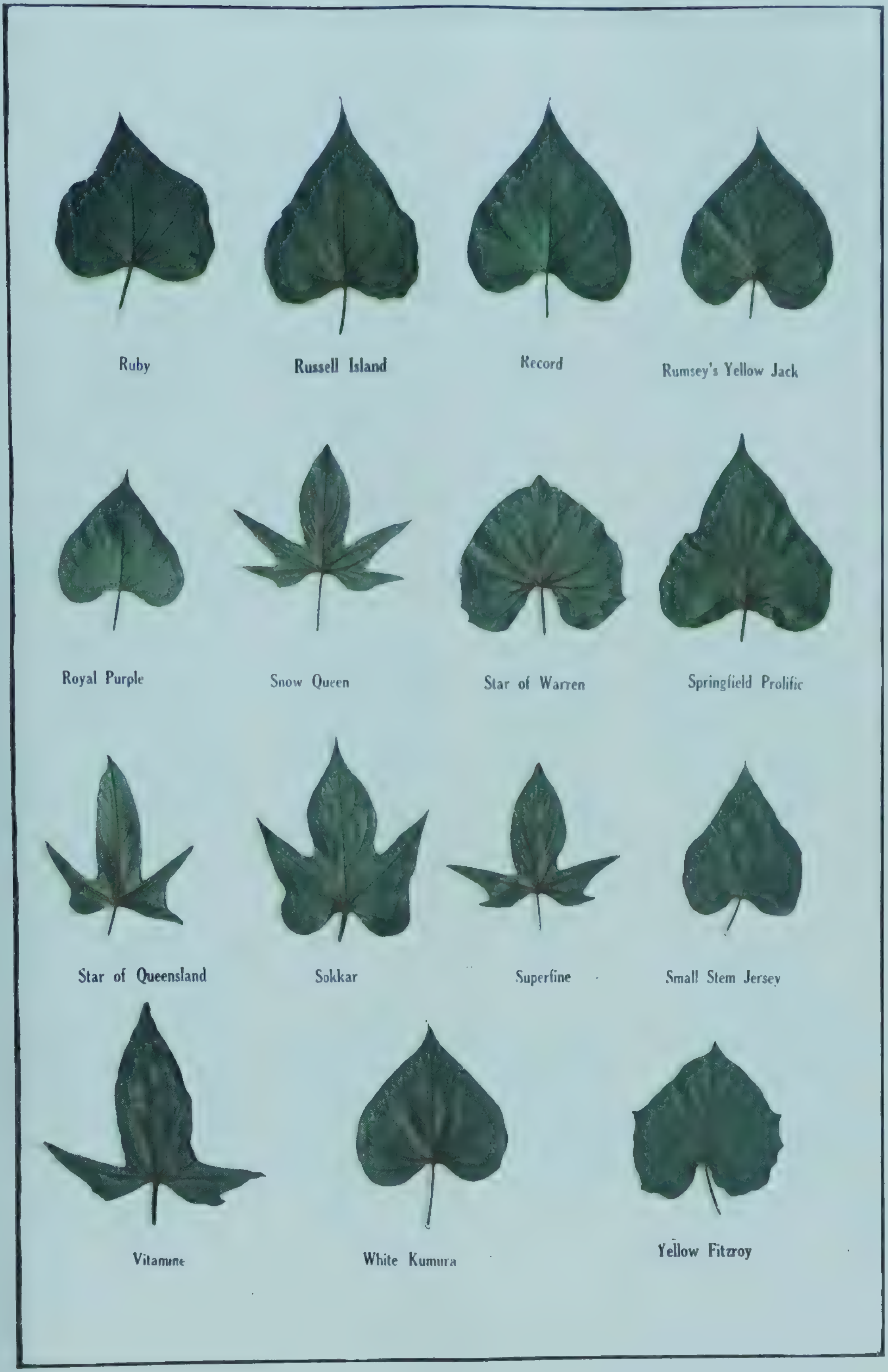
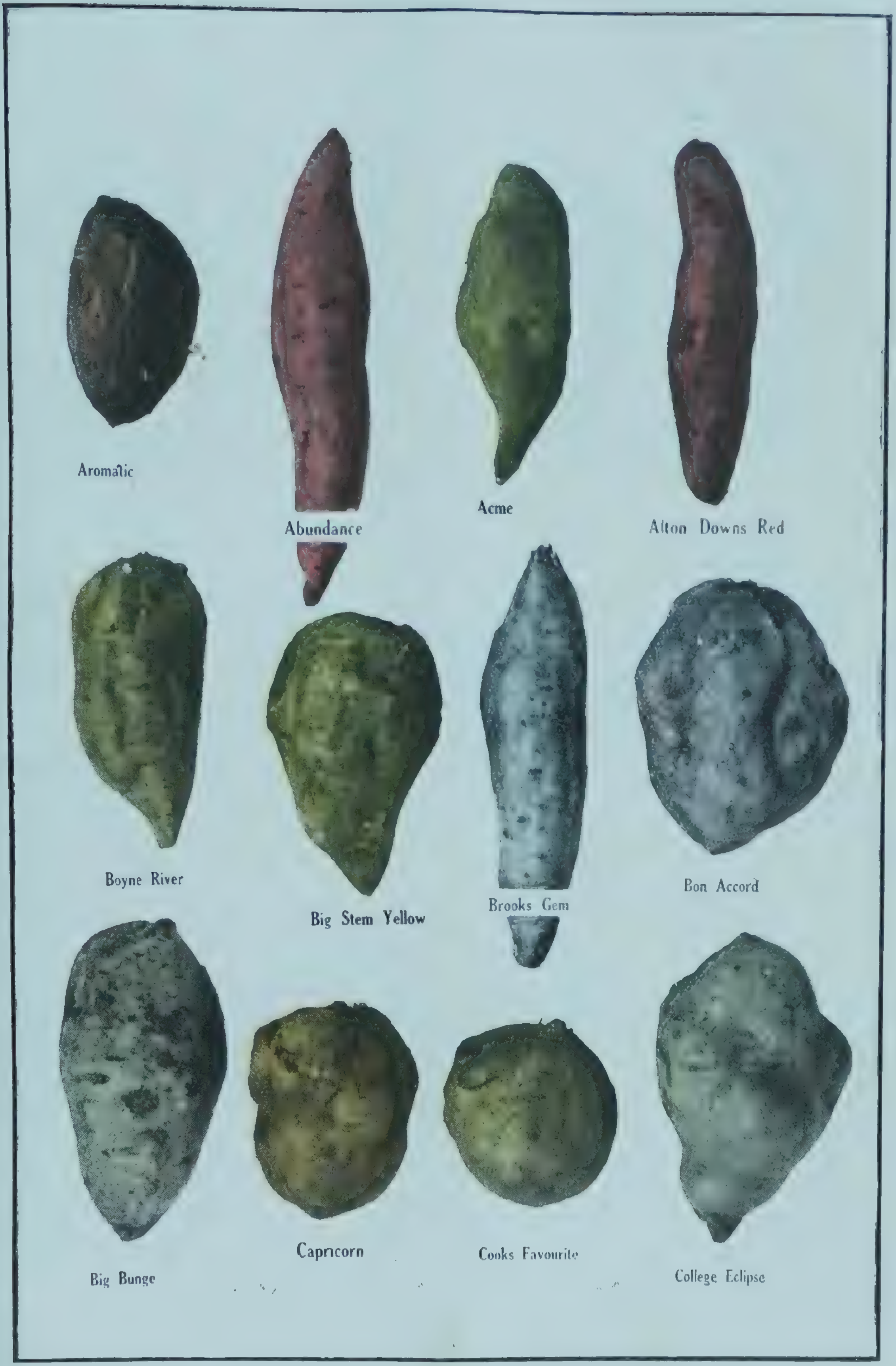

Aromatic
Abundance
Acme
Alton Downs Red
Boyne River
Big Stem Yellow
Brooks Gem
Bon Accord
Big Bunge
Blancia
Capricorn
Cooks Favourite
College Eclipse
Capt. Page
Director
Don River

PLATE 7.


Emerald
Farmers Special
Flourball
Golden Casket
Giant Gindie
Golden Nugget
Homehill
Hermitage
Improved Long Bunch
Kairi
Mammoth Cattle
Matchless
Mammy
Nancy Hall
Prospector
Pink Rambler


Ruby
Russell Island
Record
Rumsey's Yellow Jack
Royal Purple
Snow Queen
Star of Warren
Springfield Prolific
Star of Queensland
Sokkar
Superfine
Small Stem Jersey
Vitamine
White Kumura
Yellow Fitzroy


Aromatic
Abundance
Acme
Alton Downs Red
Boyne River
Big Stem Yellow
Brooks Gem
Bon Accord
Big Bunge
Capricorn
Cooks Favourite
College Eclipse

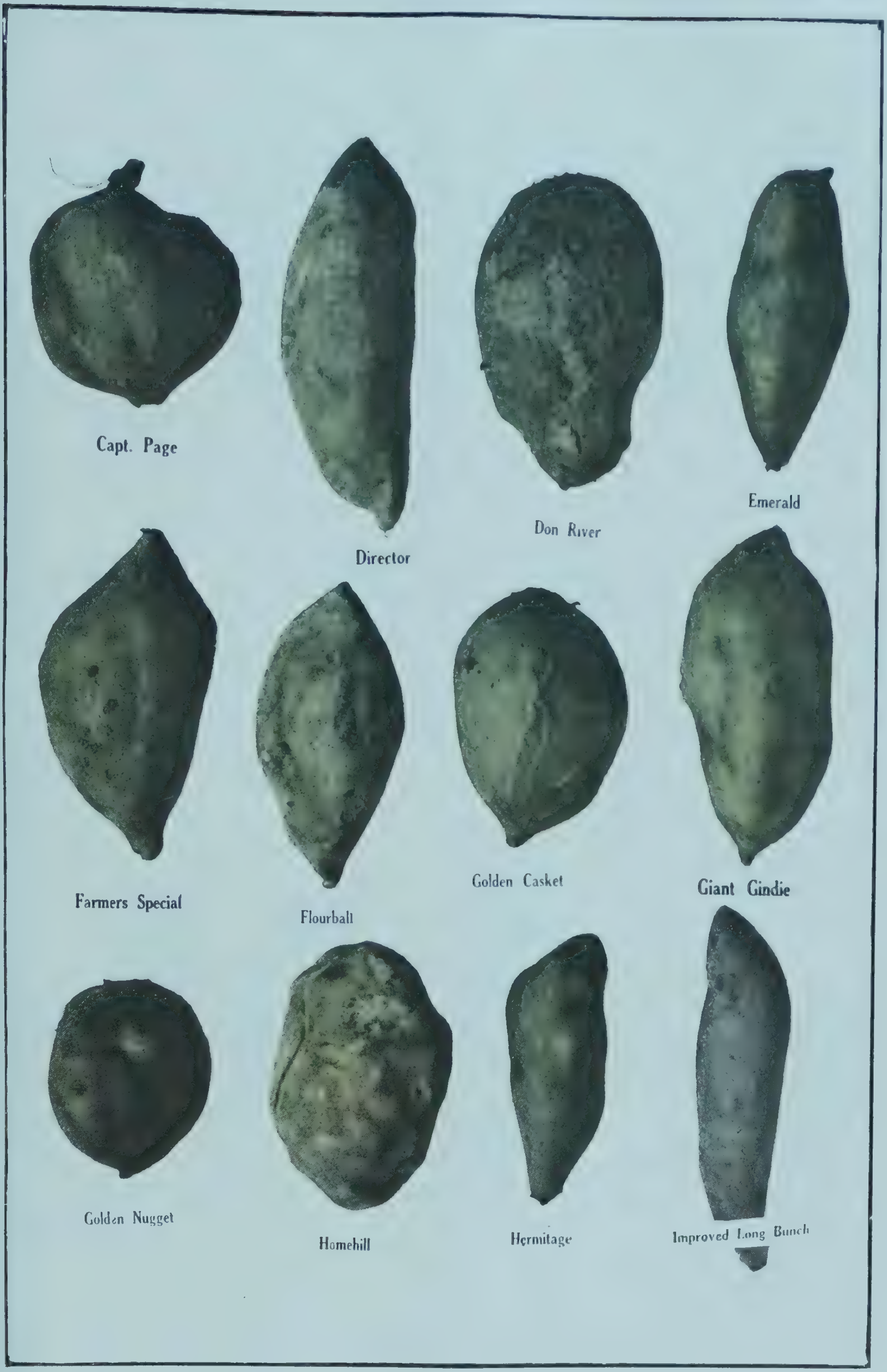

Capt. Page
Director
Don River
Emerald
Farmers Special
Flourball
Golden Casket
Giant Gindie
Golden Nugget
Homehill
Hermitage
Improved Long Bunch

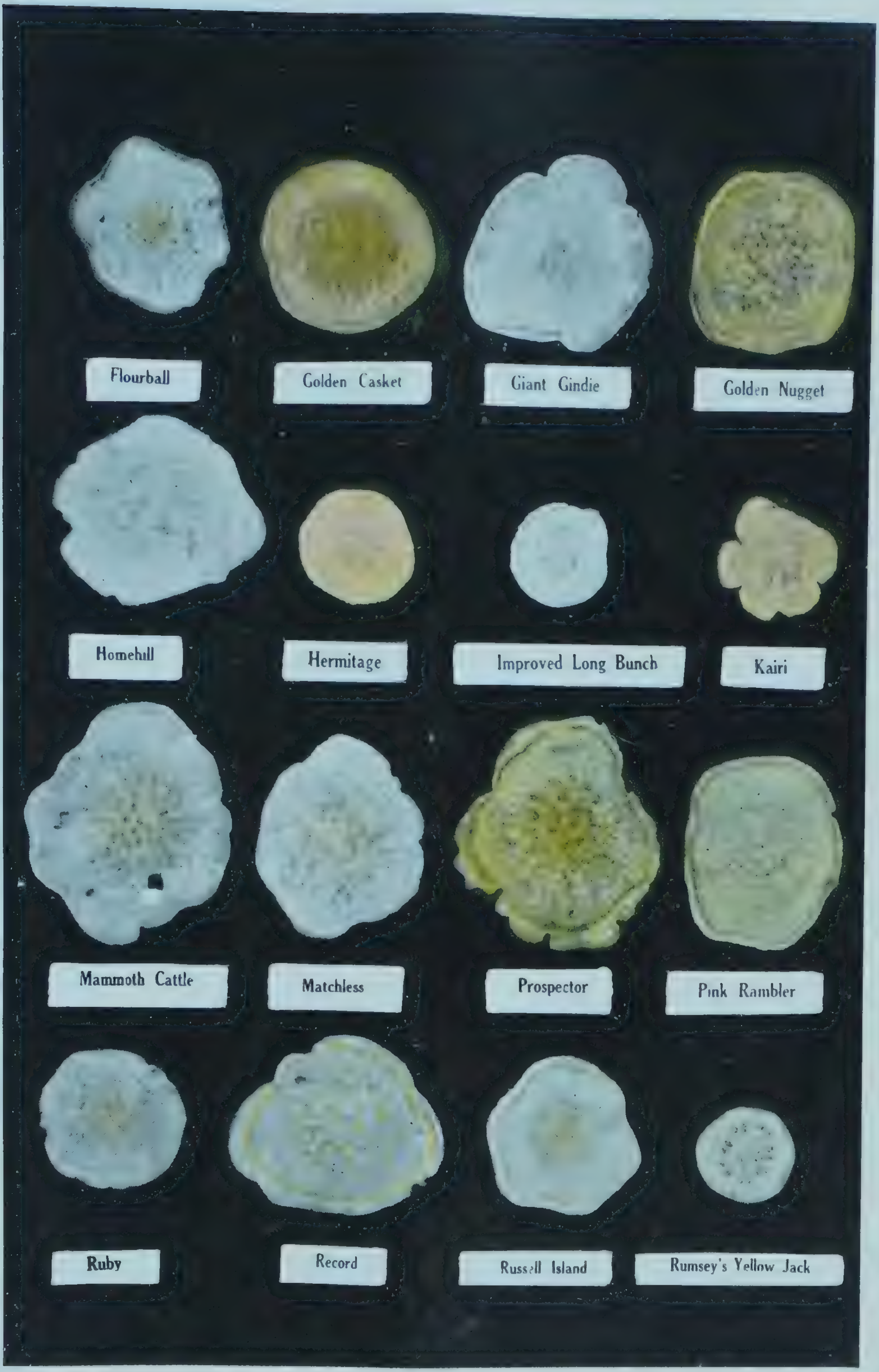
PLATE 11.


Kairi
Mammoth Cattle
Matchless
Prospector
Pink Rambler
Ruby
Record
Russell Island
Rumsey's Yellow Jack
Royal Purple
Snow Queen
Star of Warren


Springfield Prolific
Star of Queensland
Sokkar
Superfine
Small Stem Jersey
Vitamine
White Australia
Yellow Fitzroy
White Kumura

PLATE 13.


Aromatic
Abundance
Acme
Alton Downs Red
Boyne River
Big Stem Yellow
Brooks Gem
Bon Accord
Big Bunge
Cooks Favourite
College Eclipse
Capt. Page
Director
Don River
Emerald
Farmers Special


Flourball
Golden Casket
Giant Gindie
Golden Nugget
Homehill
Hermitage
Improved Long Bunch
Kairi
Mammoth Cattle
Matchless
Prospector
Pink Rambler
Ruby
Record
Russell Island
Rumsey's Yellow Jack


Royal Purple
Snow Queen
Star of Warren
Springfield Prolific
Star of Queensland
Sokkar
Superfine
Small Stem Jersey
Vitamine
Yellow Fitzroy
White Australia
White Kumura

Farm and Garden Notes for September.

With the advent of spring, cultivating implements play an important part in farming operations.

The increased warmth of soil and atmosphere is conducive to the growth of weeds of all kinds, particularly on those soils that have only received an indifferent preparation.

Potatoes planted during last month will have made their appearance above the soil, and where doubt exists as to their freedom from blight, they should be sprayed with either Burgundy or Bordeaux mixture as soon as the young leaves are clear of the soil surface.

Land which has received careful initial cultivation and has a sufficiency of sub-surface moisture to permit of a satisfactory germination of seeds may be sown with maize, millets, panicum, sorghums, melons, pumpkins, cowpeas, broom millets, and crops of a like nature, provided, of course, that the areas sown are not usually subjected to late frosts.

Rhodes grass may be sown now over well-prepared surfaces of recently cleared forest lands or where early scrub burns have been obtained, and the seed is sown subsequent to showers. More rapid growths, however, are usually obtainable on areas dealt with, say, a month later.

In connection with the sowing of Rhodes grass, farmers are reminded that they have the Pure Seeds Act for their protection, and in Rhodes grass, perhaps more than any other grass, it is necessary that seed of good germination only should be sown. A sample forwarded to the Department of Agriculture will elicit the information free of cost as to whether it is worth sowing or not.

Where the conditions of rainfall are suited to its growth, paspalum may be sown this month.

The spring maize crop, always a risky one, requires to be sown on land which has received good initial cultivation and has reserves of soil moisture. Check-row seeding in this crop is to be recommended, permitting as it does right-angled and diagonal cultivation by horse implements, minimising the amount of weed growth, and at the same time obtaining a soil mulch that will, with the aid of light showers, assist to tide the plant over its critical period of "tasselling."

Although cotton may be sown this month, it usually stands a better chance if deferred until October. The harvesting of cotton during the normal rainy season is, if possible, to be avoided.

The sowing of intermediate crops prior to the preparation of land for lucerne sowing should be carried out in order that early and thorough cultivation can take place prior to the autumn sowing.

The following subsidiary crops may be sown during the month:—Tobacco and peanuts, plant sweet potatoes, arrowroot, sugar-cane, and cow cane (preferably the 90-stalked variety), and in those districts suited to their production yams and ginger. Plant out coffee.

KITCHEN GARDEN.—Now is the time when the kitchen garden will richly repay all the labour bestowed upon it, for it is the month for sowing many kinds of vegetables. If the soil is not naturally rich, make it so by a liberal application of stable manure and compost. Manure for the garden during summer should be in the liquid form for preference. Failing a sufficient supply of these, artificials may be used with good results. Dig or plough the ground deeply, and afterwards keep the surface in good tilth about the crops. Water early in the morning or late in the evening, and in the latter case, stir the soil early next day to prevent caking. Mulching with straw, leaves, or litter will be of great benefit as the season becomes hotter. It is a good thing to apply a little salt to newly dug beds. What the action of salt is, is not exactly known, but when it is applied as a top dressing it tends to check rank growth. A little is excellent for cabbages, and especially for asparagus, but too much renders the soil sterile, and causes hardpan to form. French or kidney beans may now be sown in all parts of the State. The Lima bean delights in the hottest weather. Sow the dwarf kinds in drills 3 ft. apart and 18 in. between the plants, and the climbing sorts 6 ft. each way. Sow Guada bean, providing a trellis for it to climb on later. Sow cucumbers, melons, marrows, and squash at once. If they are troubled by the red beetle, spray with Paris green or London purple. In cool districts, peas and even some beetroot may be sown. Set out egg plants in rows 4 ft.

apart. Plant out tomatoes $3\frac{1}{2}$ ft. each way, and train them to a single stem, either on stakes, trellis, or wire netting. Plant out rosellas. Sow mustard and cress, spinnach, lettuce, vegetable marrows, custard marrows, parsnips, carrots, chicory, eschalots, cabbage, radishes, kohl-rabi, &c. These will all prove satisfactory, provided the ground is well worked, kept clean, and that water, manure, and, where required, shade are provided.

Orchard Notes for September.

THE COAST DISTRICTS.

September is a busy month for the fruitgrowers in the coastal districts of this State, as the returns to be obtained from the orchards, vineyards, and plantations depend very largely on the trees, vines, and other fruits getting a good start now.

In the case of citrus orchards—especially in the Southern half of the State—it is certainly the most important month in the year, as the crop of fruit to be harvested during the following autumn and winter depends not only on the trees blossoming well but, what is of much more importance, that the blossoms mature properly and set a good crop of fruit.

This can only be brought about by keeping the trees healthy and in vigorous growth, as, if the trees are not in this condition, they do not possess the necessary strength to set their fruit, even though they may blossom profusely. The maintenance of the trees in a state of vigorous growth demands—first, that there is an adequate supply of moisture in the soil for the requirements of the tree; and, secondly, that there is an adequate supply of the esential plant-foods available in the soil.

With respect to the supply of moisture in the soil, this can only be secured by deep and systematic cultivation, excepting in seasons of good rainfall or where there is a supply of water for irrigation. As a rule, September is a more or less dry month, and when it is dry there is little chance of securing a good crop of fruit from a neglected orchard.

If the advice that was given in the Notes for August regarding the conservation of moisture in the soil has been carried out, all that is necessary is to keep the soil stirred frequently, so as to prevent the loss of moisture by surface evaporation. If the advice has been ignored, then no time should be lost, but the soil should be brought into a state of good tilth as quickly as possible.

Where there is a supply of water available for irrigation, the trees should receive a thorough soaking if they require it. Don't wait till the trees show signs of distress, but see that they are supplied with an adequate supply of moisture during the flowering and setting periods.

It is probable that one of the chief causes why navel oranges are frequently shy bearers in the coastal districts is that the trees, though they produce a heavy crop of blossoms, are unable to set their fruit, owing to a lack of sufficient moisture in the soil at that time, as during seasons when there is a good rainfall and the trees are in vigorous growth or where they are grown by irrigation, as a rule they bear much better crops. The importance of maintaining a good supply of moisture in the soil is thus recognised in the case of this particular variety of citrus fruit.

When the trees show the want of sufficient plant-food—a condition that is easily known by the colour of the foliage and their weekly growth, the orchard should be manured with a quick-acting, complete manure; such as a mixture of superphosphate, sulphate of ammonia, and sulphate of potash, the plant-foods in which are soluble in the water contained in the soil and are thus readily taken up by the feeding roots.

Although the above has been written mainly in respect to citrus orchards, it applies equally well to those in which other fruit trees are grown. Where the land has been prepared for bananas, planting should take place during the month. If the plantation is to be made on old land, then the soil should have been deeply ploughed and subsoiled and brought into a state of perfect tilth prior to planting. It should also receive a good dressing of a complete manure, so as to provide an ample supply of available plant-food. In the case of new land, which has, as a rule, been scrub that has been recently fallen and burnt off, the first operation is to dig the holes for the suckers at about 12 ft. apart each way. Good holes should be dug, and they should be deep enough to permit the top of the bulb or corm of the sucker to be 6 in. below the surface of the ground.

Take great care in the selection of the suckers, and see that they are free from beetle borers or other diseases.

As a precaution it is advisable to cut off all old roots and to dip the corms for two hours in a solution of corrosive sublimate, made by disslving 1 oz. of this substance in 6 gallons of water.

In old banana plantations keep the ground well worked and free from weeds and remove all superfluous suckers.

Where necessary, manure—using a complete fertiliser rich in potash, nitrogen, and phosphoric acid, such as a mixture of meatworks manure and sulphate of potash, 4 of the former to 1 of the latter.

Pineapples can also be planted now. The ground should be thoroughly prepared —viz., brought into a state of perfect tilth to a depth of at least 1 ft., more if possible—not scratched, as frequently happens; and when the soil requires feeding, it should be manured with a complete manure, which should, however, contain no superphosphate.

Old plantations should be kept in a good state of tilth and be manured with a complete fertiliser in which the phosphoric acid is in the form of bones, basic phosphate, or finely ground phosphatic rock, but on no account as superphosphate.

The pruning of custard apples should be carried out during the month, leaving the work, however, as late in the season as possible, as it is not advisable to encourage an early growth, which often means a production of infertile flowers. If the weather conditions are favourable, passion vines can also be pruned now, as if cut back hard they will make new growth that will bear an autumn crop of fruit instead of one ripening during the summer.

Grape vines will require careful attention from the time the buds start, and they should be regularly and systematically sprayed from then till the time the fruit is ready to colour with bordeaux mixture, in order to prevent loss by downy mildew or anthracnose.

Where leaf-eating beetles, caterpillars, or other insects are present, the trees or plants on which they are feeding should be sprayed with arsenate of lead. All fruit-fly infested fruit must be gathered and destroyed and on no account be allowed to lie about on the ground, as, if the fly is allowed to breed unchecked at this time of the year, there is very little chance of keeping it in check later in the season.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Where not already completed, the winter spraying with lime-sulphur should be finished as early in the month as possible. Black aphis should be fought wherever it makes its appearance by spraying with a tobacco wash, such as black-leaf forty, as if these very destructive insects are kept well in hand the young growth of flowers, leaves, wood, and fruit will have a chance to develop. Wooly aphis should also be systematically fought wherever present, as once the trees are in leaf it is much more difficult to treat.

The working over of undesirable varieties of fruit trees can be continued. The pruning of grape vines should be done during the month, delaying the work as long as it is safe to do so, as the later the vines are pruned the less chance of their young growth being killed by late frosts. Keep the orchards well worked and free from weeds of all kinds, as the latter not only deplete the soil of moisture but also act as a harbour for many serious pests, such as the Rutherglen bug.

Grape vines should be swabbed with the sulphuric acid solution, mentioned in the Notes for August, when the buds begin to swell and just before they burst, as a protection against black spot and downy mildew.

New vineyards can be set out, and, in order to destroy any fungus spores that may be attached to the cuttings, it is a good plan to dip them in bordeaux mixture before planting. The land for vines should be well and deeply worked, and the cutting should be planted with one eye only out of the ground and one eye at or near the surface of the ground.

In the warmer parts which are suitable for the growth of citrus fruits, the land must be kept well cultivated, and if the trees need irrigating they should be given a good soaking, to be followed by cultivation as soon as the land will carry a horse without packing.

In these parts fruit-fly should be systematically fought, as it will probably make its appearance in late citrus fruits and loquats; and if this crop of flies is destroyed, there will be every chance of the early crops of plums, peaches, and apricots escaping without much loss.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1923.	JULY.		AUGUST.		SEPTEMBER.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·46	5·6	6·36	5·20	6·9	5·36
2	6·46	5·6	6·35	5·21	6·8	5·36
3	6·46	5·6	6·34	5·22	6·7	5·37
4	6·46	5·6	6·33	5·23	6·6	5·37
5	6·46	5·6	6·32	5·24	6·4	5·38
6	6·46	5·7	6·31	5·24	6·3	5·38
7	6·46	5·7	6·31	5·24	6·2	5·39
8	6·46	5·7	6·31	5·24	6·0	5·39
9	6·46	5·8	6·30	5·24	5·59	5·40
10	6·45	5·8	6·29	5·25	5·58	5·40
11	6·45	5·9	6·29	5·25	5·57	5·41
12	6·45	5·10	6·28	5·26	5·56	5·42
13	6·44	5·11	6·27	5·27	5·54	5·43
14	6·44	5·12	6·26	5·28	5·53	5·44
15	6·43	5·12	6·25	5·29	5·52	5·44
16	6·43	5·12	6·25	5·29	5·51	5·44
17	6·43	5·12	6·24	5·29	5·50	5·44
18	6·43	5·13	6·23	5·30	5·49	5·45
19	6·43	5·13	6·22	5·30	5·48	5·45
20	6·43	5·13	6·21	5·30	5·47	5·45
21	6·42	5·14	6·20	5·31	5·46	5·45
22	6·42	5·14	6·19	5·31	5·45	5·46
23	6·42	5·14	6·18	5·31	5·44	5·46
24	6·42	5·15	6·17	5·32	5·43	5·46
25	6·41	5·15	6·16	5·32	5·42	5·46
26	6·41	5·16	6·15	5·33	5·41	5·47
27	6·40	5·17	6·14	5·33	5·39	5·47
28	6·40	5·17	6·13	5·34	5·38	5·48
29	6·39	5·18	6·12	5·35	5·36	5·48
30	6·38	5·18	6·11	5·35	5·25	5·49
31	6·37	5·19	6·10	5·36	...	...

PHASES OF THE MOON, OCCULTATIONS, &c.

6 July ☽ Last Quarter 11 56 a.m.
14 „ ● New Moon 10 45 a.m.
21 „ ☾ First Quarter 11 32 a.m.
28 „ ○ Full Moon 8 33 a.m.

7th July, Apogee, 9·48 p.m.
22nd „ Perigee 11·54 a.m.

5 Aug ☽ Last Quarter 5 22 a.m.
12 „ ● New Moon 9 17 p.m.
19 „ ☾ First Quarter 4 7 p.m.
26 „ ○ Full Moon 8 29 p.m.

4th Aug. Apogee, 4·24 p.m.
16th „ Perigee, 8·0 p.m.

3 Sept. ☽ Last Quarter 10 47 p.m.
11 „ ● New Moon 6 53 a.m.
17 „ ☾ First Quarter 10 4 p.m.
25 „ ○ Full Moon 11 16 a.m.

1st Sept. Apogee, 10·54 a.m.
13th „ Perigee, 8·24 a.m.
29th „ Apogee, 3·24 a.m.

During July the planet Mercury will pass eastwards, apparently from the constellation Taurus, through Gemini and Cancer into Leo. Venus will also appaently pass from Taurus through Gemini into Cancer, Mars from Gemini into Cancer. Jupiter will seem to move only about one degree eastward in Libra, while Saturn will apparently move about a degree and a half further east amongst the stars of Virgo.

From 1st August to 30th September Mercury and Venus will apparently move on through Leo into Virgo, and Mars from the eastern part of Cancer to that of Leo. Jupiter will apparently move only about eight degrees further east in Libra, and Saturn about five and a half degrees in Virgo.

A partial eclipse of the moon, visible in Queensland, will take place about 9 o'clock in the evening of 26th August.

A total eclipse of the sun will take place a fortnight later, visible only in the North Pacific, Central America and Gulf of Mexico.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

A Cross in this space is a reminder that your Subscription to the Journal expires with this number.

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QUEENSLAND AGRICULTURAL JOURNAL

VOL. XX. SEPTEMBER, 1923. PART 3.

Event and Comment.

The Current Issue.

An account of the great Annual Show of the Royal National Association fitly occupies much space in this issue. The activities of the Department of Agriculture and Stock, as illustrated at the Exhibition, are well described in text and picture. Other Show features include a full list of awards in the more important classes. A further instalment of an informative series on irrigation in Queensland, bearing particularly on the use of artesian water in the West, will be read with much interest. The Clydesdale stallions recently purchased by the Government for use in improving the breeding of farm horses are fully described. Valuable contributions on the technical side from the Seeds, Fertilisers, and Stock Foods Section and the Bureau of Sugar Experiment Stations are among other special features. Seasonal contributions include an illustrated treatise on the cultivation of cotton in Queensland, which is also on issue to cotton-growers in bulletin form. The September Journal, generally, is a good number.

Queensland's Opportunity.

A full report by a well-known dairy expert on our butter states that there is very keen activity in the British butter market, and that Queensland as a competitor has an excellent opportunity to more than justify her claim as a first-rate butter and cheese producer. Last season Queensland contributed some excellent butter, but the percentage of "choicest" leaves something to be desired. It appears that one of the principal faults is that the "choice" flavour is weak or insipid, and the salt butter lacks briskness. He insists on the necessity for factories to carefully adopt practices which aid in the development of the choice butter flavour in cream, and to fix it in the butter. With this constantly in mind, and aided by strict grading of the cream and butter, he considers that Queensland can advance her position in the British market for flavour of butter second to none in the world. "Fishiness" in our butter has greatly diminished of late, and this fact is attributed to the more careful grading of the cream, to reducing the acidity for churning, and to lower temperature. "Choice" and "first-grade" Queensland butter, although highly creditable in many respects, has shown traces of heat in the flavour and texture, and has consequently suffered in price. In colour, finish, and packing, it is stated that there is little room for improvement in connection with Queensland butter.

The Queensland Climate—Snow in August.

Queensland by many people outside its borders is looked upon as a land of perpetual summer, but a glimpse of the Downs mantled in glistening white during early August would quickly dispel that illusion. As a matter of fact, as travelled Queenslanders know, this State possesses one of the finest and healthiest climates in the world. On the northern tablelands, as in other districts, heavy frosts were experienced in the course of the winter, and snow fell over a wide area on the southern uplands.

Oversea Marketing of Queensland Products.

The annual report of the Agent-General (Hon. J. A. Fihelly) contains much valuable information on our oversea marketing operations in primary products. Reference is made in the report to the depression in the Queensland meat export trade. Changes in values, from artificial to comparatively stable levels; changes in consumptive demand, from one class of meat to another; and changes in volume, character, and direction of supplies had seriously affected operations. If it is any consolation to those interested in the industry, it may be safely assumed that the worst of the crisis has passed, and the market must improve. Any substantial improvement, the report continues, can only be achieved by the adoption of a settled policy and thorough organisation. The economic embarrassment of Europe is the cause of many of the present difficulties, and until there is some assurance of stability Australia's market must necessarily be curtailed. It must be remembered, too, that each year witnesses a progressive recovery in the numbers and quality of Continental herds and flocks, which in turn means a lessened demand for extraneous supply. Queensland must relax no effort to regain the market, and to this end increasing attention should be paid to the question of a general raising of standard and quality; to an improvement in transport facilities; to correcting the widespread laxity in grading; and to an improvement in loading arrangements. Increased skill in slaughtering and dressing are also considerations upon which the technical people in London lay stress.

The London Butter Market.

According to the report butter on the London market is rapidly regaining its pre-war volume, as a considerable expansion in imports show, and this expansion is being maintained despite the disappearance of several sources of supply. The greatly increased output from Queensland has compensated somewhat for these deficiencies. In fact, the quantity of butter received in London from Empire sources now exceeds that imported from foreign countries, whereas before the war the percentage was 20 Empire to 80 foreign.

Price fluctuations have been quite abnormal. Every time the market rose it rose too high, and every time it fell it fell too low, a considerable element of luck characterising selling results. The average selling price was lower than in any year since 1916. Some complaints were received of one or two of the earlier shipments that they were not quite up to the usual standard, but the quality soon improved, and is now very good, our best quality being admittedly quite the equal of Danish or Irish.

A decided improvement was noticeable during the season in the class of boxes used by the various factories, and it is hoped that the better standard in this respect will continue. In the competition with supplies from other sources, it is distinctly desirable for goods to be landed in London in sound and attractive looking packages at which the most critical would not be able to cavil. The different type of box adopted by Victoria and South Australia proved popular among those who have to handle supplies on the other side, because it affords an easier grip on the box. The wood is thinner than usual, but is strengthened by a sort of outer frame which can be readily gripped. There is, however, no serious fault to be found with the type of box used by Queensland exporters.

At the Annual London Dairy Show the following awards were made for salted varieties:—

First prize—100 points, Logan and Albert Co-operative Company.

Second prize—99½ points, Maryborough Co-operative Company.

Third prize—99 points, Goombungee Co-operative Company.

For unsalted butter the Logan and Albert Company also secured a third prize. In addition to these awards the exhibits of the Mundubbera and Biggenden factories in the salted class were each highly commended, both gaining 97 points. The only other exhibit securing this distinction was the Coraki Co-operative Company of New South Wales. The results reflect great credit on the Queensland dairying industry.

Southern Interest in Queensland Farmers' Organisation.

Agriculturists in other States are giving some attention to the Queensland farmers' move towards complete organisation. In Southern Press reports reference is made frequently to the efforts of Queensland producers in practical co-operation. At a meeting of the State Fruit Advisory Board of Victoria in Melbourne recently ("Age," 22nd August, 1923) methods of marketing were discussed. One speaker (Mr. Wade) emphasised the necessity of educating growers in modern practices, and instanced the progress of Queensland orchardists towards the general adoption of a sound selling system. Queensland, he continued, had moved in the right direction in insisting that trans-border fruit consignments must be of a certain standard. Sir John Taverner, at the same meeting, also emphasised the need of organisation, and expressed the opinion that the Board should seriously consider the Queensland scheme and bring forward a report on the marketing of fruit. The Board decided to convene a special meeting to consider the Queensland fruit marketing proposals adopted by the recent orchardists' conference in Brisbane.

CLYDESDALE SIRES FOR QUEENSLAND.

GOVERNMENT PURCHASE OF PEDIGREED HORSES.

With the object of assisting practically in the breeding of draught stock in Queensland, the Department of Agriculture and Stock lately purchased six Clydesdale stallions in the South for service in the farming districts of the State. The description, pedigree, and prize-winnings of each horse are given below.

FABRIC'S HEIR.

Fabric's Heir (Mitchell and O'Briens, imp. from New Zealand), brown colt, foaled 1917.

Sire.—Dunure Fabric (16,864, C.S.B., imp.); grandsire, Dunure Footprint (15,203, C.S.B.). Gained in 1912, 1913, and 1914 the central district of Aberdeenshire premium; in 1915 he was the central district of Ayrshire stud horse; in 1916

PLATE 29.—"FABRIC'S HEIR."

he was the Ayr district of Ayrshire stud horse; in 1917 he was the county district of Ayrshire stud horse. The "Australasian" of 31st May, 1919, states that Dunure Footprint was standing that season at a service fee of £100 a mare; G. grandsire, Baron of Buchlyvie (11,263 C.S.B.) was sold by auction in Scotland for £9,500. He gained in 1905 and 1907 the Strathmore district of Forfarshire premium; in 1906 the Girvan district of Ayrshire premium; in 1908 the central district of Ayrshire premium; G.g. grandsire, Baron's Pride (9,122 C.S.B.) was awarded numerous local prizes as a youngster, and in 1894, when four years old, was first and champion male Clydesdale exhibited at the Highland and Agricultural Society's show, Aberdeen; he also gained first prize at Glasgow show. In 1894 and 1895 he won the Kirkcudbright District Society's premium; in 1896 he gained the Machars of Wigton premium; and in 1897, 1898, and 1899 he was again hired by the Kirkcudbright district.

Fabric's Heir's dam, Lady McGregor, by Premier Pride (11,845, C.S.B., imp.), who won, as a two-year old, first prize at the Royal Show, London, and first prize at Castle Douglas. In New Zealand he gained first and champion prizes at Ashburton

in 1907; second dam, Flora McGregor (504, N.Z.C.S.B.), by Highland Prince (618, N.Z.C.S.B.) (C), by Crown Prince (712, A.D.H.S.B.) (C), by Lord Dalisbury (1,205, C.S.B., imp.); third dam, Gipsy Queen, by Vanquisher (1,063, A.D.H.S.B.) (C), by Young Vanquisher (imp.) (967, A.D.H.S.B.) (C); fourth dam, Lass o' Gowrie, by Prince Royal (372, N.Z.C.S.B.) (C), by Craiglevar (imp.) (1,045, A.D.H.S.B.) (C); fifth dam, Bess II., by Prince Charlie (626, C.S.B., imp.); sixth dam, Bess, by Napoleon (556, C.S.B., imp.); seventh dam, Black Bess, by Black Prince (60, C.S.B., imp.); eighth dam, Miss Todd, by Canterbury; ninth dam, imported to New Zealand from Victoria.

Fabric's Heir won, in 1918, first prizes at Ashburton and Timaru shows; in 1919 second prize at Ashburton parade; and in 1920 first prize and reserve for champion at Timaru and second prize at Ashburton.

GENERAL WALLACE.

General Wallace.—(1,134, N.Z.C.S.B., Mitchell and O'Briens, imp. from N.Z.) bay colt, foaled 14th November, 1918; bred by Mr. W. Kennedy, Otarau, N.Z.

Sire.—General Douglas (16,412, C.S.B., imp.); grandsire, Douglas Chief (11,682, C.S.B.); G. grandsire, Prince Thomas (10,262, C.S.B.), won first and champion prizes at the Highland Society's show, Stirling; G.g. grandsire, Sir Thomas (9,681, C.S.B.); G.g.g. grandsire, Castlereagh (10,324, C.S.B.); G.g.g.g. grandsire, the

PLATE 30.—"GENERAL WALLACE."

famous Darnley (222, C.S.B.), won second prize at the Highland Society's show, Stirling, in 1873; the Glasgow premiums in 1876 and 1877; first prize at the Highland Society's show, Edinburgh, in 1877; the champion cup at the Highland Society's show, Dumfries, in 1878; second prize at the Royal Show of England at Kilburn in 1879; first prize at the Royal Show of England at Carlisle in 1880; first prize at the Highland and Agricultural Society's show at Glasgow in 1882, as sire of the best family of five aged animals exhibited; and first prize and champion cup at the Highland and Agricultural Society's show at Edinburgh in 1884.

General Wallace's dam, Studleigh Queen (1,034, N.Z.C.S.B.), by Abbot (11,987, S.C.B., imp.), who was the best two-year-old at the Royal Northern and was placed first at the Highland Society's show, Dumfries. In New Zealand he gained in 1905 first and champion prizes at Tapanui; in 1909 he gained first prize and reserve champion at the Southland metropolitan stallion parade; he has also gained two first prizes for stallion with progeny. Second dam, Dolly, by Carmyle (1,066, (A.D.H.S.B.) (C), who won first and champion prizes at St. Arnaud, Birchin, Shepparton, Tatura, Murchison, and Nathalia, and first prizes at Donald and Wycheproof, and second prize at the Royal show, Melbourne. In New Zealand he

won first prize in 1903 at Invercargill, and was got by Kelvin (456, A.D.H.S.B.) (C), who won seventeen first prizes, by Lord Clyde (478, C.S.B., imp.). Third dam, Mary Macarthur, by Macarthur (818, A.D.H.S.B.) (C), who won thirty two first, two second, and one third prizes, and was got by Macbride (2,987, C.S.B., imp.). Fourth dam, Lily McCormick, by famous Lord Salisbury (1,205, C.S.B., imp.).

BARON AGAIN.

Baron Again (14, C.C.S.B.), bay roan horse, foaled 1917, bred by Gillis and Walter, Glen Lass stud farm, Werribee, Victoria.

Sire.—Baron Carlisle (218, A.C.S.B.), won 1914 first and champion prizes at Wagga, N.S.W., first and champion prizes at Wangaratta, first prize at Werribee, and first prize in his class and first prize for best actioned horse at Geelong; in 1915 he won first and champion prizes at Wagga, N.S.W. (beating the Melbourne Royal champion horse Captain Dale), and first and champion prizes at Wangaratta and Werribee; in 1916 he gained second prize and reserve for champion at Royal show, Melbourne; and in 1917 third prize at Royal show, Melbourne. Grandsire, Baron Belmont (13,973, C.S.B., imp.), won in 1909 the Bathgate district of West Lothian premiums, and in 1910 the Kelsyth and Kirkintilloch district of Dumbartonshire

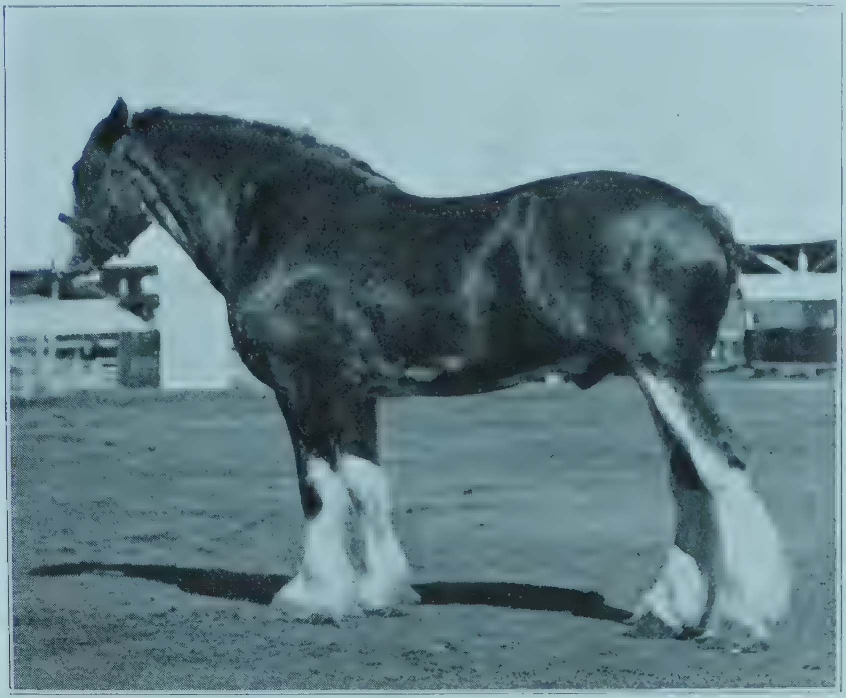


Plate 31.—"Baron Again."

premium. G.g. sire, Baron of Buchlyvie (11,263, C.S.B.), was sold by auction in Scotland for £9,500. He gained in 1905 and 1907 the Strathmore district of Forfarshire premiums, in 1906 the Girvan district of Ayrshire premiums, in 1908 the central district of Ayrshire premium. G.g. grandsire, Baron's Pride (9,122, C.S.B.) was awarded numerous local prizes as a youngster, and in 1894, when four years old, was first and champion male Clydesdale exhibited at the Highland and Agricultural Society's show, Aberdeen; he also gained first prize at Glasgow show. In 1894 and 1895 he won the Kirkcudbright district society's premium; in 1896 he gained the Machars of Wigton premium; and in 1897, 1898, and 1899 he was again hired by the Kirkcudbright district.

Baron Again's dam, Peerless (28,346, C.S.B., imp.), gained in 1911 third prize at Kirkcudbright, second at Castle Douglas, and first prize at Dumfries, beating the mares that had previously beaten her. In New Zealand she won the following prizes, viz:—In 1912 first and champion prizes at Gore and Tapanui and third prize at Invercargill, being beaten by the imported mares Baron's Brilliant and Agatha; in 1913 she was not shown; in 1914 she won first and champion prizes at Keko and Gore. Her sire, Perfect Motion (13,123, C.S.B.), gained in 1907 second prize at the Highland Society's show, Edinburgh, and in 1909 first prize at the Glasgow stallion show. Second dam, Peeress (16,388, C.S.B.), by Sir

Christopher (10,286, C.S.B.); third dam, Pride of Glamis (14,062, C.S.B.), by Main's of Aries (10,379, C.S.B.); fourth dam, Princess (11,086, C.S.B.), by Holyrood (4,446, C.S.B.); fifth dam, Princess Alice (6,626, C.S.B.), by famous Macgregor (1,487, C.S.B.); sixth dam, Jean II. (1,639, C.S.B.), by Prince of Kelvin (656, C.S.B.); seventh dam, Jean, by Salmon's Champion (737, C.S.B.); eighth dam, Darling, by Wellington (1,348, C.S.B.).

Baron Again won the following prizes:—In 1920 second prize in his class, Sydney Royal show, and Breeders' cup (25 guineas) for best colt bred by owners; first prize in three-year-old class at Melbourne Royal show, 1920; and first in £100 Government shield; also first and champion prizes at Werribee in 1920 and first and champion prizes at Kyneton in 1920.

BOLD WYLLIE.

Bold Wyllie (1,095, N.Z.C.S.B., Mitchell and O'Brien's, imported from New Zealand), bay horse, foaled 1918; bred by J. G. Wyllie, Rosebery Farm, Outram, New Zealand.

PLATE 32.—"BOLD WYLLIE."

Sire.—Baron Bold (674, A.D.H.S.B.) (C) (got in Scotland, foaled in Victoria), gained first and champion prizes at Christchurch and Dunedin in 1911, 1912, 1913, 1914, and 1915. He also won the Clydesdale Horse Society's Cup at Dunedin and twice gained the Otago Challenge Cup. Grandsire, Baron's Pride (9,122, C.S.B.), was awarded numerous local prizes as a youngster, and in 1894, when four years old, was first and champion male Clydesdale exhibited at the Highland and Agricultural Society's show, Aberdeen; he also gained first prize at Glasgow show. In 1894 and 1895 he won the Kirkcudbright District Society's premium; in 1896 he gained the Machars of Wigton premium; and in 1897, 1898, and 1899 he was again hired by the Kirkcudbright district. G. grandsire, Sir Everard (5,353, C.S.B.), won in 1888 first prize at Glasgow and the Renwick and Aucrencairn district of Kirkcudbright premium; in 1889 and 1890 he won the Glasgow premium; in 1891 he was the Kintyre district of Argyleshire club horse; in 1892 he gained the Kintyre district of Argyllshire premium; in 1893 the western district of Dumbartonshire premium; in 1894 the central district of Banffshire premium; and in 1897 and 1898 he was the lower ward of Renfrewshire stud horse. G.g. grandsire, Top

Gallant (1,850, C.S.B.), won in 1880 the Glasgow premium and first prize at the Glasgow May show. G.g.g. grandsire, the famous Darnley (222, C.S.B.), who was one of the greatest sires of his time in Scotland.

Bold Wyllie's dam, Bragg (848, N.Z.C.S.B.), by Marconi (11,817, C.S.B., imp.), who won in 1904 the Glasgow premium; second dam, Doll, by Richmond (496, N.Z.C.S.B.), by Pride of Richmond (214, A.C.S.B.), by Gallant Scotsman (Town's imp.), by Young Lord Lyon (9/4, C.S.B.); third dam, Fan, by McGregor (497, N.Z.C.S.B.), by Awa Moa (108, N.Z.C.S.B.), by Young Banker (1,351, C.S.B., imp.); fourth dam, Jess, by Sir Colin (3,188, C.S.B., imp.), who gained many prizes as a yearling and two-year-old at local shows and first prize at Paisley a few days before being exported. In New Zealand in 1873 he gained second prize at Taieri.

PREMIER AGAIN.

Premier Again.—D. Greig's Premier Again (1,634, N.Z.D.H.S.B.), imported from New Zealand; bay colt; foaled November, 1917, and stands about 16½ hands high.

Sire.—Premier Pride (11,845, C.S.B., imp., and 68, N.Z.C.S.B.) won as a two-year-old first prize at the Royal Show, London, and first prize at Castle Douglas; in New Zealand he gained first and champion prizes at Ashburton in 1917. His progeny have won many prizes in New Zealand, including first prize at the Canterbury metropolitan show in 1912 for four colts or fillies, the progeny of one stallion. G. grandsire, Baron's Pride (9,122, C.S.B.) was one of the best breeding horses in Scotland. He was awarded numerous prizes as a youngster, and in 1894, when four

PLATE 33.—"PREMIER AGAIN."

years old, was first and champion male Clydesdale exhibited at the Highland and Agricultural Society's show, Aberdeen; he also gained first prize at Glasgow show. In 1894 and 1895 he won the Kirkcudbright premium, in 1896 the Machars of Wigton premium, and in 1897, 1898, and 1899 he was again hired by the Kirkcudbright district. G.g. grandsire, Sir Everard (5,353 C.S.B.), winner of first prize at the Glasgow show as a three-year-old in 1888 and the premium of £150 at the same show in 1890 and 1891. G.g.g. grandsire, Top Gallant (1,850, C.S.B.). G.g.g.g. grandsire, Darnley (222, C.S.B.).

Dam.—Heather Bell III. (2,717 N.Z.D.H.S.B.), by Black Knight (imp.) (12,860, C.S.B.), by Hillhead Chief (10,774, C.S.B.), by Scottish Crown (9,851, C.S.B.);

second dam, Young Heather Bell (2,204, N.Z.D.H.S.B.), by Sandy Erskine (imp.) (10,900, C.S.B.), who won first and champion prizes at Oamaru and Dunedin shows in 1900 and 1901, by Prince Alexander (8,899, C.S.B.); third dam, Heather Bell, by British Monarch (271, N.Z.D.H.S.B.), by British Lion (270, N.Z.D.H.S.B.), by Argyle (2,567, C.S.B.), by Large Jock (444, C.S.B.); fourth dam, Young Bell, by Prince Victor (imp., 652, C.S.B.), by Prince of Wales (673, C.S.B.), who was winner of numerous prizes; fifth dam, Heather Bell, who was champion mare in New Zealand from Dunedin to Christchurch for many years, by Heather Jock (142, A.D.H.S.B.), by Blackleg (imp., 71, C.S.B.).

Premier Again was second at Christchurch parade 1920, first at Kirwee and Lesston as three-year-old, the only times shown. He has served one season at the stud, and his mares are well in foal, and holds the New Zealand Government four-year-old certificate. This horse holds the New Zealand and the Victorian certificates of soundness.

GLENALLA.

Glenalla (1,484, N.Z.C.S.B., Mitchell and O'Brien's, imported from New Zealand); bay colt; foaled 1919; bred by Mr. J. McGill, Sedgemere, New Zealand.

Sire.—Dunure Coral (16,562, C.S.B., imp.); grandsire, Baron of Buchlyvie (11,263, C.S.B.), who was sold at auction for £9,500. He gained in 1905 and 1907 the Strathmore district of Forfarshire premiums; in 1906 the Girvan district of Ayrshire premium; in 1908 the central district of Ayrshire premium. G. grandsire, Baron's Pride (9,122, C.S.B.), was awarded numerous local prizes as a youngster,

PLATE 34.—"GLENALLA."

and in 1894, when four years old, was first and champion male Clydesdale exhibited at the Highland and Agricultural Society's show, Aberdeen; he also gained first prize at Glasgow show. In 1894 and 1895 he won the Kirkcudbright District Society's premium; in 1896 he gained the Machars of Wigton premium; and in 1897, 1898, and 1899 he was again hired by the Kirkcudbright district. G.g. grandsire, Sir Everard (5,353, C.S.B.), won in 1888 first prize at Glasgow and the Glasgow premiums in 1889 and 1890. G.g.g. grandsire, Top Gallant (1,850, C.S.B.), won in 1880 the Glasgow premium and first prize at the Glasgow May show. G.g.g.g. grandsire, the famous Darnley (222, C.S.B.).

Glenalla's dam, Nancy, by Sandy's Heir (1,014, N.Z.C.S.B.), by Alexander's Heir (505, N.Z.C.S.B.), by St. Alexander (9,397, C.S.B., imp.); second dam, Bloss, by Glencoe (885, N.Z.C.S.B.), by Vanquisher (1,063, A.D.H.S.B.) (C), by Young Vanquisher (imp., 967, A.D.H.S.B.) (C); third dam, Darling, by Conqueror (564, N.Z.C.S.B.), by Lord Salisbury (1,205, C.S.B., imp.), who was a great prize taker. Glenalla gained in 1922 second prizes at Waitemate and Oamaru.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILK RECORDS FOR JULY, 1923.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Prim	Friesian ...	4 April, 1923	1,110	3·3	42·60	
Miss Security ...	Ayrshire ...	8 June, ,,	840	3·9	38·40	
College Cold Iron	Jersey ..	23 April, ,,	510	5·0	30·00	
Soprano	Ayrshire ...	14 June, ,,	600	4·2	29·40	
College Ma Petite	Jersey ...	12 June, ,,	540	4·4	27·90	
College St. Martha	,, ...	25 June, ,,	468	4·6	25·20	
Rainfall of Marinya	Ayrshire ...	29 Mar., ,,	600	3·6	25·20	
College Prima Donna	Friesian ...	19 Mar., ,,	630	3·4	24·90	
College Grandeur	Jersey ...	11 July, ,,	360	5·6	23·80	
College Evening Glow	,, ...	5 April, ,,	420	4·8	23·70	
Lady Loch II. ...	Ayrshire ...	20 April, ,,	570	3·6	23·70	
Lady Peggy ...	,, ...	20 Dec., 1922	390	4·8	23·10	
Snowflake	Shorthorn	17 April, 1923	570	3·5	23·10	
Mistress May ...	Ayrshire ..	20 June, ,,	510	3·8	22·80	
Comedienne ...	Jersey ...	11 July, ,,	418	4·5	22·22	
Charming Damsel	Ayrshire ...	27 April, ,,	510	3·7	21·90	
Lute	,, ...	26 April, ,,	510	3·6	21·30	
Auntie's Lass ...	,, ...	18 April ,,	420	4·2	20·70	
Lady Mitchell ...	Friesian ...	1 May, ,,	510	3·5	20·70	

A SUMMARY OF SOME EXPERIMENTS CARRIED OUT BY THE BUREAU OF SUGAR EXPERIMENT STATIONS.—IX.

The Director of Sugar Experiment Stations, Mr. H. T. Easterby, commenced this series in the May (1922) Journal, and in his opening article discussed deep cultivation experiments and tabulated comparative crop result from subsoiled and non-subsoiled fields. The second instalment, an account of results of irrigation experiments and the action of irrigation and manures upon the density and purity of sugar juices, appeared in the June (1922) issue. In the August number Mr. Easterby's notes covered experiments in fertilisation, and were followed in the succeeding issue by an account of distance experiments and resultant crops. In the October (1922) number the summary was continued with notes on the introduction and testing of cane varieties. In the February Journal experiments to determine if cane sets cut from arrowed canes have a prejudicial effect on the germination and subsequent yield were discussed. In his introduction to the Summary of Experiments above mentioned, the Director stated that a summary of the chemical work accomplished by the Bureau, to be prepared by Mr. George R. Patten, formerly Chief Chemist to the Bureau, would also be presented. Mr. Patten has now completed this summary, which entailed a great deal of elaborate work and occupied much time. The results will appear from time to time in the Journal until complete, when the whole summary will then be published in bulletin form.—Ed.

SOIL AND OTHER CHEMICAL ANALYSES—*continued.*

Summarised by GEORGE R. PATTEN, Analyst, Agricultural Laboratory, Brisbane, formerly Chief Chemist, Bureau of Sugar Experiment Stations.

The analyses in the following pages deal principally with feedstuffs such as cane leaves, grasses, various cane top ensilage; also the proportions of nitrogen in trash

PLATE 35.—CANE AT THE CARRIER, SOUTH JOHNSTONE SUGAR MILL.

and green cane leaves. Several of these analyses were made for the Sugar Bureau by the Agricultural Chemist.

MISCELLANEOUS ANALYSES.

ANALYSES OF CANE LEAVES FOR ESTABLISHING THE RELATIVE NUTRITION VALUES OF VARIETIES.

Constituent.	Green Substance.	Dry Substance.
1.—VARIETY: NEW GUINEA 15, BADILA.		
	Per cent.	Per cent.
Moisture	74·700	00·000
Dry substance	25·300	100·000
Crude fibre	6·244	24·680
Total nitrogen	·257	1·018
× 6·25 = to proteids	1·609	6·362
Albuminoid nitrogen	·219	·868
× 6·25 = to proteids	1·372	5·425
Amide nitrogen (diff.)	·038	·150
Ether extract	·536	2·120
Carbohydrates (less fibre)	15·064	59·542
Total ash	1·886	7·456
Soluble ash	1·845	7·296
Albuminoid ratio	1 : 12·0	
2.—VARIETY: SOUTH AFRICA, YUBAN.		
Moisture	73·100	00·000
Dry substance	26·900	100·000
Crude fibre	8·079	30·035
Total nitrogen	·319	1·188
× 6·25 = to proteids	1·997	7·425
Albuminoid nitrogen	·271	1·010
× 6·25 = to proteids	1·697	6·312
Amide nitrogen (diff.)	·048	·178
Ether extract	·655	2·436
Carbohydrates (less fibre)	14·719	54·720
Total ash	1·495	5·560
Soluble ash	1·448	5·384
Albuminoid ratio	1 : 9·6	

The analyses of these varieties were carried on from what may be called the feeding standpoint. The Yuban cane, a South African variety, is a heavy cropper, the crop comprising an enormous number of sticks, which, however, are very small in diameter. Although the sugar content is fair, the amount of labour engaged in the harvesting of this variety renders it economically undesirable as a sugar producer. As a feeding crop, however, it is most useful, and has already gone out from the stations to farmers who intend to use it solely as a forage crop. The analysis of New Guinea 15, natively known as "Badila," was made in order to furnish a comparison with the South African variety. As analytical tables have shown, New Guinea 15 is one of the finest sugar-producing varieties in the State.

ANALYSES OF GRASSES.

The following analyses were made to determine the nutritive value of certain feedstuffs growing at the Mackay Experiment Station. Both the grasses analysed—namely, Paspalum dilatatum and Guinea grass—are largely used in the Mackay district for feeding stock. Two analyses of paspalum are given, one of the young grass, and the other of a much older crop. In places where the grass is grazed, however, the shoots are generally always more or less young, and it will be seen that at this stage it contains the largest amount of protein, the most necessary and expensive ingredient of feeding stuffs. The Paspalum dilatatum is shown to be superior to the Guinea grass in proteids and carbohydrates.

ANALYSES OF PASPALUM DILATATUM GROWN AT THE EXPERIMENT STATION, MACKAY.

Constituent.	YOUNG CROP.		OLD CROP.	
	Green Substance.	Dry Substance.	Green Substance.	Dry Substance.
	Per cent.	Per cent.	Per cent.	Per cent.
Moisture	74·400	00·000	66·731	00·000
Dry substance	25·600	100·000	33·269	100·000
Crude fibre	7·680	30·000	10·167	30·560
Total nitrogen	·372	1·456	·169	·509
× 6·25 = to proteids	2·329	9·100	1·056	3·181
Albuminoid nitrogen	·307	1·200	·141	·424
× 6·25 = to proteids	1·920	7·500	·881	2·650
Amide nitrogen (diff.)	·065	·256	·028	·085
Asparagine	·350	1·371	·150	·455
Ether extract	·788	3·080	1·550	4·660
Carbohydrates (less fibre)	12·790	49·961	17·814	53·547
Total ash	2·070	8·088	2·704	8·128
Soluble ash	1·927	7·528	2·568	7·720
Nutritive value	..	..	22·357	67·213
Nutritive ratio	..	..	1 : 20·1	1 : 20·1

ANALYSIS OF GUINEA GRASS GROWN AT THE EXPERIMENT STATION, MACKAY.

Constituent.	Green Substance.	Dry Substance.
	Per cent.	Per cent.
Moisture	78·450	00·000
Dry substance	21·550	100·000
Crude fibre	8·132	37·736
Total nitrogen	·238	1·108
× 6·25 = to proteids	1·487	6·925
Albuminoid nitrogen	·161	·747
× 6·25 = to proteids	1·006	4·668
Amide nitrogen (diff.)	·058	·271
Asparagine	·310	1·451
Ether extract	·707	3·280
Carbohydrates (less fibre)	8·918	41·385
Total ash	2·474	11·480
Soluble ash	2·391	11·096

ANALYSIS OF PANICUM MUTICUM.

With the object of determining the value of the above grass for fodder purposes, an analysis was carried out. This grass is very common in some of the Northern districts, and is much relished by stock of all kinds, who seem to prefer it to any other grass

ANALYSIS OF PANICUM MUTICUM GROWING AT SUGAR EXPERIMENT STATION

Constituent.	Green Substance.	Dry Substance.
	Per cent.	Per cent.
Moisture	75·330	..
Dry substance	24·670	100·000
Crude fibre	8·270	33·525
Total nitrogen	·204	·825
× 6·25 = to proteids	1·275	5·156
Albuminoid nitrogen	·197	·797
× 6·25 = to proteids	1·231	4·975
Amide nitrogen	·007	·028
Asparagine	·037	·151
Ether extract	·487	1·975
Carbohydrates (less fibre)	12·609	51·122
Total ash	2·036	8·253
Soluble ash	1·881	7·626
Nutritive value	14·979	60·721
Nutritive ratio	1 : 10·8	1 : 10·8

ANALYSIS OF CASSAVA ROOTS GROWN AT THE SUGAR EXPERIMENT STATION, MACKAY.

Cassava roots make an excellent food for pigs if proper precautions are taken. Dangerous proportions of Hydrocyanic (Prussic) Acid were found in the roots, but this is easily got rid of by chopping up the roots, boiling them, running the water off, rinsing in cold water, and again running this water away. The roots are then ready for use.

ANALYSIS OF CASSAVA ROOT GROWN AT THE EXPERIMENT STATION, MACKAY.

Constituent.	Fresh Substance.	Dry Substance.
	Per cent.	Per cent.
Moisture	60·650	00·000
Dry substance	39·350	100·000
Crude fibre	1·196	3·040
Total nitrogen	·178	·452
× 6·25 = to proteids	1·112	2·825
Albuminoid nitrogen	·087	·222
× 6·25 = to proteids	·545	1·387
Amide nitrogen (diff.)	·090	·230
Asparagine	·484	1·232
Ether extract	·354	·904
Carbohydrates (less fibre)	35·949	91·357
Total ash	·818	2·080
Soluble ash	·739	1·880

As stock of all kinds feed upon the Water Hyacinth, now choking the Mackay Fresh Water Lagoons, adjacent to which the Experiment Station is situated, an analysis of the plant was made to find its feeding value. This is relatively poor, owing largely to the high water content. It is, however, a good standby in time of drought, and though a serious pest, is not without its uses:—

ANALYSIS OF WATER HYACINTH GROWING IN LAGOON, NEAR EXPERIMENT STATION.

Constituent.	Green Substance.	Dry Substance.
	Per cent.	Per cent.
Moisture	90·650	..
Dry substance	9·350	100·000
Crude fibre	1·367	14·624
Total nitrogen	·127	1·357
× 6·25 = to proteids	·793	8·481
Albuminoid nitrogen	·117	1·252
× 6·25 = to proteids	·731	7·825
Amide nitrogen (diff.)	·010	·105
Asparagine	·053	·562
Ether extract	·276	2·960

ANALYSIS OF WATER HYACINTH GROWING IN LAGOON, NEAR EXPERIMENTAL STATION—*continued.*

Constituent.	Green Substance.	Dry Substance.
	Per cent.	Per cent.
Carbohydrates (less fibre)	5·423	57·997
Total ash	1·499	16·032
Soluble ash	1·463	15·648

SUGAR-CANE TOPS ENSILAGE.

	Per cent.
Moisture	78·09
Dry matter	21·91
Crude protein	1·34
True protein	·66
Ash	2·72
Crude fibre	8·87
Crude fat	·79
Carbohydrates, &c. (diff.)	8·19
Total N.	·214
Proteid N.	·105
Amide N.	·075
Ammonia	·034
Acidity as lactic acid	1·73

This silage is made every year at the Sugar Experiment Station, Bundaberg, its feeding value is low, but is an assistance during dry weather mixed with other foodstuffs.

NITROGEN DETERMINATION IN CANE LEAVES.

PROPORTIONS OF NITROGEN, DRY CANE LEAVES (TRASH), AND GREEN CANE LEAVES.

Variety.	Moisture.		Nitrogen.			
	Trash (Dry Leaves).	Green Leaves.	Trash (Dry Leaves), including Water.	Trash (Dry Leaves), Water Free.	Green Leaves (Fresh Substance), including Water.	Green Leaves (Dry Substance). Water Free.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Badila	11·60	69·80	0·356	0·403	0·314	1·040
Trinidad 60	10·80	68·00	0·416	0·466	0·383	1·199
New Guinea 4 ..	8·80	68·00	0·458	0·502	0·395	1·235
,, 8A ..	8·80	67·60	0·346	0·379	0·360	1·112
,, 24 ..	9·60	64·80	0·584	0·646	0·430	1·222
,, 24A ..	11·40	67·40	0·360	0·406	0·388	1·191
,, 24B ..	10·60	69·20	0·339	0·379	0·360	1·169
,, 64 ..	9·40	68·00	0·493	0·544	0·500	1·563
Bois Rouge	9·60	66·40	0·549	0·607	0·374	1·114

Attention has been called to the loss of nitrogen that takes place when cane trash lies upon the surface of the ground and not ploughed in. As soon as the dead leaves begin to rot, the nitrogen is converted into ammonia, and escapes back into the air in its gaseous form. The data contained in the above table make this loss of nitrogen still more clear.

IRRIGATION IN QUEENSLAND—III.

BY H. E. A. EKLUND, late Hydraulic Engineer, Queensland Water Supply Department.

A continuation of a comprehensive survey of irrigation possibilities in Queensland. Mr. Eklund was formerly in the State Service as an Hydraulic Engineer and as Executive Engineer in charge of the Inkerman Irrigation Works in North Queensland, and is now engaged on an important water supply project in South Australia. The widespread interest now centred upon land settlement in Queensland, and the general practical development of the forward Government policy in relation to Agricultural extension and the enrichment of rural life in this State, makes the publication of Mr. Eklund's observations particularly timely. The review will be continued through succeeding issues of the Journal.—Ed.

IRRIGATION IN THE WEST.

"I have watered the barren land ten leagues wide,
But in vain I have tried, and in vain I have tried
To show the sign of the Great All Giver
The word to a people—Oh! Lock your river."

Practically the whole of the State west of the Dividing Range consists of open undulating plains, which in a good season have the appearance of well cultivated fields. These plains are truly "stored fertility under rainless skies." In years to come when water is made available these plains should be the granaries of the world. But until then the production of wool and mutton will remain the principal primary industries. Calculating the utility of this region on the basis of one sheep to every three acres, there is room in this State alone for over 85,000,000 sheep besides a good supply of cattle. Up to the present the largest number of sheep shown by statistics as having been depastured in any one year is only about 24,000,000.

But no one who has not seen the West in a drought can imagine the difficulties which beset the pastoral industry. Until the advent of artesian water "relief country" may have been more plentiful than at present, but when food for stock and water became scarce, the difficulties in removing stock from one locality to another were serious.

The discovery of artesian water marked a new era in pastoral pursuits, but the knowledge that water could be obtained by boring resulted in what now appears to have been a competition of waste. Boring was carried out indiscriminately without system or method; anywhere, anyhow.

Not till 1910, or nearly thirty years after the first flow had been struck, did it become sufficiently apparent that control was necessary to enable the passing of suitable legislation.

The first artesian bore in Australia was sunk in 1879 by David Brown,* of Kallara Station in New South Wales, and the first artesian water in Queensland was obtained (according to the Hon. S. Fraser)† when J. S. Loughead, drilling for the Squatting Investment Company, struck a flow on Thurulgoona, in February, 1886. Sometimes a controversy arises as to when artesian boring was first commenced in this State, and to whom the credit is due.

In a pamphlet by the Hon. Simon Fraser it is claimed that the first flowing bore in Queensland was put down on the Thurulgoona Run, in the southern portion of the State. Even here it is acknowledged that the Water Supply Department, in

* It is worth noting here that Mr. Brown's efforts were largely due to the opinions expressed by Mr. Russell, the Government Astronomer of New South Wales at the time. To the latter must go the credit of having, from careful observation of rainfall and river gaugings, deduced the fact that underground waters existed. And after all this there are people who still talk of the plutonic origin of the artesian water.

† "True Story of the Beginning of the Artesian Water Supplies of Australia."

1882, has procured "four boring machines . . . and an attempt was made to probe still deeper beneath the surface of the earth in the hope of tapping a subterranean supply of water." This "True Story of the Beginning of the Artesian Water Supply of Australia," then deals only with the success of the private enterprise in obtaining this flow, but states later that the Hydraulic Engineer's report for the year ending 1887 "tends to obscure the fact that it was the success of the Canadian Pole Tool at Thurulgoona which first drew departmental attention to the work of Loughead's party."

From an examination of departmental reports it is quite clear that since 1882 consistent efforts were made on every possible occasion to induce the Government of the day to procure machinery and men capable of deep well boring.

At last these recommendations were acted upon and a suitable plant was procured and put in charge of a Mr. Arnold, who was sent to Blackall in 1885, after the Government Geologist, Mr. R. L. Jack, and Mr. J. B. Henderson, Government Hydraulic Engineer, had conjointly travelled over the western area and picked sites, in their opinion, suitable for deep boring.

This bore at Blackall was not completed till 1888; but to any unbiased mind perusing early records it is quite clear that the Water Supply Department of the

PLATE 36.—MEASURING THE FLOW OF AN ARTESIAN BORE.

State was first in taking active steps to prove the deep well supplies. Private enterprise may have met with the first flow; but, if so, it appears to be one of the vagaries of fortune.

With the advent of artesian water it was thought that irrigation would be largely practised. In some cases attempts were made and fair success appeared at first to attend these experiments. But after a year or more it was found that areas which had been properly saturated with bore water a few times became hard and more or less barren. Chemical analysis of the water showed a certain amount of alkalinity, but hardly sufficient to cause the rapid deterioration of soil observed. It was also noted that though the alkalinity of the water from one bore was greater than that observed in another, yet the effect on the soil of the former was perceptibly less than that from the latter. This phenomenon continued a vexed question until the experiments carried out by Mr. R. S. Symmonds, of the Agricultural Branch in New South Wales, showed that the trouble was largely in the soil. He states that certain constituents of the soil cause the formation of diffusible colloids when acted upon by the alkali in the water, and experiments carried out by him, and others under his direction, support this theory. The colloid so formed causes the soil to set, and it also becomes impervious to air and moisture. Silica being one of the constituents most susceptible to the action of the alkali, sandy soils are stated to suffer more than the purer black clays.

The method used by him to break up the colloid in the soil is by adding a correct proportion of well-diluted nitric acid when the soil is in semi-plastic condition. This is said not only to restore friability, but also to increase the fertility.

Mr. Symmonds has also suggested a method of utilising the pressure from artesian bores to generate electricity and by this means synthetically make nitric acid. As the pressure from the great majority of bores is very small, and flows and pressures constantly diminishing, the idea, though good theoretically, is hardly practicable, for two reasons:—

Firstly, the first cost of such an installation would be too great to show reasonable return on the expenditure; secondly, an artesian bore develops its maximum horse-power when shut back to about half its flow. This would necessitate, for irrigation purposes, a well-constructed bore to every 100 to 300 acres, depending on the flow available. With a diminishing supply, which requires careful nursing to supply our wants for stock and domestic use only, any attempt to use the supply for irrigation on a large scale appears inexpedient.

It is evident that in arriving at his estimate of what could be done by power from artesian bores, Mr. Symmonds has been under a misapprehension. Even engineers not personally acquainted with artesian conditions, or at least not having had any practical experience of artesian bores, have made similar mistakes. One

PLATE 37.—AN ARTESIAN BORE PARTLY CLOSED.

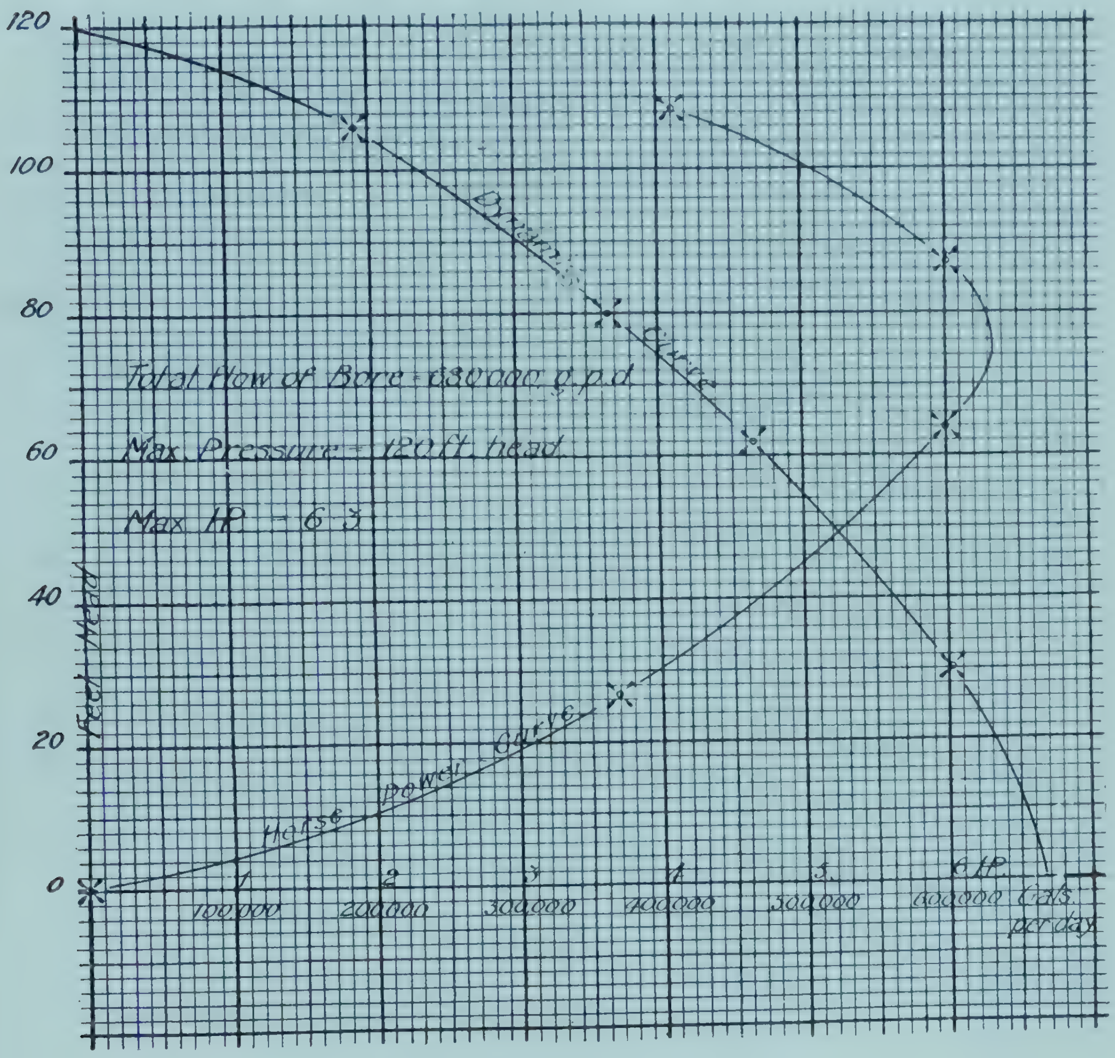
author, a well-known engineer, quotes figures of what appears intended for a statement showing the theoretical horse-power available from bores, but in all cases the power stated is enormously in excess of the true theoretical power, and proportionately in excess of that likely to be obtained in actual practice. The error is quite excusable and is due to the peculiarity that in artesian bores the flowing pressure does not correspond with the static pressure; or, in other words, the hydraulic condition differs from the hydrostatic. Consequently even the theoretical power available can only be determined after careful experimental investigation *of each bore.*

When an artesian bore is first closed down the gauge reading obtained (if the closing has been carefully done) will closely approximate to the hydraulic head. The effect of closing the bore is to change the condition from hydraulic to hydrostatic, the result being that the pressure shown increases after closing. This is due to several causes, and the rate of the increase in the pressure shown is governed by at least two factors, the principal one being the porosity of the rock, the other being the amount of gas present. After the bore has been closed a certain time, which differs more or less in all bores, a maximum pressure is reached, which is the true static pressure. The true flowing pressure can only be deduced after the static head has been obtained, and the former is always less than the latter. But there is no pressure shown on the gauge until the aperture through which the water

issues is restricted, consequently the effective pressure at maximum flow is nil. So also at maximum pressure the flow is nil. Hence the effective "pressure-flow" is somewhere between maximum and nil, and the pressure at which this flow is obtained can only be ascertained by experiment.

After a pressure gauge has been attached to the casing and a weir put in the drain for measuring the flow, the stop-valve on the bore is slowly turned. At every half turn or so, depending on the accuracy required, and after the flow over the weir has reached equilibrium, a reading is taken on the weir. From these two observations, repeated at intervals, the dynamic curve is first plotted. From this curve can be obtained the flow, with the pressure, at as many points as desired. With this information the horse-power curve is plotted, which will show the actual maximum theoretical horse-power available. From this figure a further deduction must be made, depending on the efficiency of the motor intended to be used; but it is generally safe to say that the actual horse-power obtainable in practice is about half of that shown by the experiment.

Below is given an actual observation and the horse-power curve plotted therefrom.



DYNAMIC AND H.P. CURVES.

The dynamic curve is plotted from the readings on weirboard and pressure gauge as below:—

Pressure x 2.307 = Ft. Head.		Flow from Tables.		Points on horse-power curve.
30	..	600,000	..	3.7 h.p.
62	..	465,000	..	6 h.p.
80	..	365,000	..	6 h.p.
103	..	190,000	..	4.1 h.p.

The formula used is $\frac{H \times W \times Q}{33000}$.

where H = head in feet.
W = weight per gallon.
Q = number of gallons per minute.

It is fairly evident that if irrigation is ever to be freely practised in the West it will not be done with artesian water. The Western soil responds best when treated with surface waters, and it is not too soon to carefully investigate possible irrigation schemes west of the Range, even if small, to ensure better uniformity in stock and wool supplies.

In view of the fact that the artesian flowing water supply is diminishing, the question of cheap power for water-raising purposes requires attention, but as it is beyond the object herein aimed at it will only be referred to briefly.

The essentials of any water-lifting appliance, briefly enumerated in order of their importance, are:—

1. It must be reliable and simple;
2. Operate at a low cost or be highly efficient;
3. Working parts must be readily accessible for inspection or repairs; and
4. Require as little attention as possible.

If reliability were the only requisite many good standard makes of engine would fill the bill. But the necessity for cheapness practically debars steam from competition in the West, on account of the high cost of fuel and consequently prohibitive cost of operating. It is chiefly because of the higher efficiency shown by internal combustion engine that they hold the pride of place. They are most frequently employed as auxiliaries to windmills, but are sometimes the only power used and while not so simple or reliable as steam engines they have many advantages. They are more convenient, the cost per horse-power is less, both first and operating, and they require less attention. Where wood is plentiful the hot air engine should be appreciated, and it is rather surprising to find that it is not more in use on the coast.

The design of oil and petrol engines is improving, and the efficiencies obtained certainly tend to increase, but the price of fuel here is ever increasing at a very rapid rate. We have as yet little or no prospect of obtaining petrol locally, and even if oil is obtained within the Commonwealth it is likely to remain dear. There is practically only one other kind of fuel—namely, alcohol—which, though not as convenient as petrol, yet has many advantages.

Alcohol Engines.

The calorific value of alcohol is about three-fifths that of petrol, but it is safer to carry and handle, will stand a higher compression when gasified and mixed with air, and should, therefore, give a much better efficiency than any yet obtained in actual practice. Alcohol is a much cleaner fuel than petrol and carbon deposits are practicaly unknown in the engine. It has, when burnt, rather a pleasant smell, but the engine will not "start up" on alcohol when cold. Any ordinary petrol engine when hot will work on alcohol without any alteration to the carburetter, but will under such conditions use from two to three times more alcohol than petrol, for the same amount of work done. The maximum value of alcohol as a fuel cannot be obtained except in a specially designed engine, which, as already stated, does not yet appear to have reached a reasonable amount of perfection. The matter is clearly one of relative costs, and if the price of alcohol per gallon were, say, half that of petrol, there is not the slightest doubt that inventors would turn their attention in this direction.

Alcohol can be and is manufacured within the Commonwealth, and must sooner or later become our chief fuel for motors unless petrol should be obtained on this continent. Alcohol is a product that can be cheaply made from a number of new materials, and if it were manufactured on a larger and cheaper scale the money now leaving the country for petrol and other oil fuels would be retained.

Geoffrey Martin and his assistants in "Industrial and Manufacturing Chemistry" under "Benefits of Industrial Alcohol to Agriculture," state that—

"Alcohol can be produced in practically unlimited quantities from a great variety of farm produce, so that every kind of soil and climate can be utilised. It can even be made from spoiled crops, corn stalks, refuse, &c. The alcohol so produced furnishes a cheap and excellent motive power for engines . . . for sunshine only is required for the production of the starchy materials from which alcohol is produced and there is no exhaustion of the soil in the process. Only carbon hydrogen and oxygen are withdrawn from the air under the influence of sunlight, and after the combustion of the alcohol they come back as carbon dioxide and water. The nitrates, phosphates, lime, &c., absorbed from the soil by the growing vegetation all remain in the immediate neighbourhood in the liquid waste from which the alcohol has been distilled, and being used as fodder are returned to the ground as manure."

The most profitable way of obtaining alcohol from vegetation is by growing potatoes, which give a heavier and a cheaper yield of starch than any other vegetable. There is no better giver of the starch and sugar necessary for alcohol than the sweet potato, which is particularly easily grown in Queensland, especially with irrigation.

The United States Department of Agriculture, in their Bulletin No. 277, 1915, publish a record of an investigation carried out to ascertain users' opinion of the alcohol engine as compared with other prime movers:—Out of 130 farmers using the engine, 46 per cent. thought them equal to the engines they had previously used; 47 per cent. considered that the new engine was better; and only 4 per cent. held the opinion that it was inferior; these last 4 per cent. stating, however, that the steam engine which they had previously used required more attention. As regards cost of maintenance 9 per cent. found the alcohol engine more costly, 34 per cent. stated "no difference," 57 per cent. holding the opinion that it was considerably cheaper.

The Bulletin concludes with some remarks of which the following are of interest:—

"An engine designed for gasolene (petrol) or kerosene can without any material alterations to adapt it to alcohol be made to give slightly more power than when operated on petrol or kerosene, but this increase is at the expense of a greater amount of fuel. By alterations to adapt the engine to the new fuel this excess of power may be increased to about 20 per cent.

"Because of the increased output without increase in size alcohol engines should sell for less per horse-power than gasolene or kerosene engines of the same class."

Apparently, then, there is here an opening for a very great and far-reaching industry. First, the production of cheap alcohol; second, the perfecting and making of an alcohol engine.

Some years ago an attempt appears to have been made by a firm of sugar planters to utilise the waste products of the mill for making alcohol. The encouragement given to them by the State Government at the time appears to have been characeristically opposed to development and advance of industry.

It is extremely gratifying to be able to record the fact that steps are now being taken to fully investigate the possibilities in this direction. The question of a proper denaturant appears to cause some concern, but as it may safely be assumed that in the near future the chief use for alcohol will be for engines, British practice should be followed, and the denaturing agent consist of some product not likely to interfere with its value as a fuel for motors.

(*The next instalment will cover Practical Consideration and Water Supply.*)

"BUNCHY TOP"—SUGGESTED BUFFER AREA.

"Bunchy Top" is recognised as a serious menace to banana-growing, and a deputation representing the Queensland Banana-growers' Institute, which interviewed the Minister for Agriculture and Stock (Hon. W. N. Gillies) recently, advocated the establishment of a buffer area, stretching 20 miles south of the Brisbane River, and the immediate employment of a pathologist to investigate the disease. The deputation, which consisted of Messrs. W. A. Cathcart, W. B. Christie, and E. A. Thelander, was introduced to the Minister by Mr. R. J. Warren, M.L.A.

In the course of his reply to the representations made, Mr. Gillies said that arrangements had been made between the New South Wales and Queensland authorities for a joint investigation. Both Mr. Darnell Smith (the New South Wales Entomologist) and Mr. H. Tryon (Queensland Entomologist) were working on the "bunchy top" problem; but the work was not getting on as quickly as he would like. It appeared to him that if the buffer-area suggestion were adopted the question of compensation would arise and would have to be considered. He would place the deputation's suggestions before the Government, and promised to give them his most serious consideration. He realised that the question was of vital moment to the banana industry, which had possibilities, now that it was protected, of great expansion. He agreed with the deputation that "bunchy top" was a serious menace, and that steps should be taken to check it, but he did not think that it was due to bananas being grown too far south. The excellent bananas grown on the Clarence River disproved that theory. "Bunchy top" must be thoroughly investigated scientifically and the cause and remedy discovered. It had been said that it was a root disease; but while this was all very well, it was not sufficient. For his part, he considered that the whole question was one that should go before the Council of Agriculture. As Minister for Agriculture, he promised to study the whole matter, and would do the best he could for them with the money available.

His Excellency the Governor, Rt. Hon. Sir Matthew Nathan, Presiding.

Reading from the President's right to left, alternately—

Hon. E. G. Theodore (Premier).

Hon. W. McCormack (Home Secretary).

Hon. W. N. Gillies (Minister for Agriculture and Stock).

Hon. J. Harry Coyne.

Hon. John Huxham (Minister for Educ tion).

Hon. John Mullan (Attorney-General).

Hon. W. Forgan Smith (Minister for Works).

Hon. James Larcombe (Minister for Railways).

Hon. James Stopford (Home Secretary).

Hon. Alf. J. Jones (Minister for Mines).

Mr. Geo. W. Watson (Clerk to Executive Council).

STATE STATIONS AND CLOSER SETTLEMENT.

In the Legislative Assembly recently the Minister in Charge of State Enterprises (Hon. W. Forgan Smith), replying to a question as to the intention of the Government to subdivide any of the State stations for closer settlement, said the intentions would be disclosed at the proper time. Before its acquisition by the Government Dillalah Station had been surveyed for closer settlement purposes. Asked whether Dillalah Station would be opened for grazing selections, Mr. Forgan Smith repeated that the Government would disclose its intentions in due course. The complaint that Dillalah State Station was a breeding-ground for dingoes was entirely without foundation, and was merely a phase of the propaganda indulged in by people having certain interests to serve.

IMPROVING THE BREED OF HORSES AND NEW LEGISLATION.

In explaining the Bill to improve the breed of horses and for incidental purposes, which was introduced in Parliament recently, the Minister for Agriculture and Stock (Hon. W. N. Gillies) said that all recognised the necessity of improving the breed of horses, draught horses particularly, and the improvement was the more essential in view of the development of the cotton industry. The present Bill, which had been recommended by the Council of Agriculture, did not propose to tax stallions, but to set up a board nominated by the Council of Agriculture, with a qualified veterinary surgeon, nominated by the Government, as chairman, and to proclaim districts. On the Council's recommendation boards would be appointed in the several districts, and annual examinations of stallions would take place. Certificates would be issued to stallions that complied with the necessary standard as to soundness, type, and suitability as sires. It was proposed that after the measure was in operation for a period of two years no stallion which did not possess a certificate should be allowed to be used for stud purposes.

QUEENSLAND TREES.

BY C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

No. 24.

THE BLUE QUANDONG.

The Blue Quandong (*Elæocarpus grandis*) is a large "scrub" tree attaining a height of about 120 feet and a barrel diameter of about 3 feet. It is one of the buttressed or "spurred" trees of the Queensland rain forests. The timber is light yellow in colour and light in weight. It is used in New South Wales for cabinet work, bee-box frames, &c., and is useful in cases where lightness in weight is requisite. The hard, bony, wrinkled "stones" of the fruit are sometimes made into necklaces and ornaments. Two characteristics of the tree are its yellow-coloured inner bark and sapwood surface, and the deep red colour which the old leaves assume. These features are frequently useful in assisting to identify the species. J. S. Gamble, in his "Manual of Indian Timbers," states that the hard tubercled nuts of *Elæocarpus ganitrus*, an Indian species, are polished, made into rosaries and bracelets, worn by Brahmins and Sanyasis, and sold in quantity at Benares, Allahabad, and Hardwar. He also states that another Indian species, *Elæocarpus oblongus*, is often conspicuous by its leaves turning red. These statements by Gamble show that the ornamental properties of the stone of the Blue Quandong and the peculiar red colour of its old leaves are also characteristic of some Indian species of the genus. The Quandong is found in the rain forests of Eastern Australia from the Nambucca River, New South Wales (J. H. Maiden), to the Endeavour River, North Queensland.

Photo. by the Authors.]

PLATE 39.—THE BLUE QUANDONG (*Elæocarpus grandis*).

A large tree in the rain forest eastward of Traveston, North Coast Line.

Photo. by Dept. of Agriculture and Stock.]

PLATE 40.—THE QUANDONG.
(A) Dry Fruit, (B) Stone or Quandong.

FRUIT FLY INVESTIGATIONS.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has made available the following report of the Entomologist at Stanthorpe, Mr. Hubert Jarvis, for the months of June (part) and July, 1923, in relation to the fruit fly and other injurious insects.

FRUIT FLY.

Persistency in Stored Fruit.

On 25th June, when examining Rokewood Apples in the Insectary, both the living maggots and pupæ of the Queensland fruit fly were found, *in situ*. In one instance an adult fruit fly was found alive in the centre of the apple in a cavity mined by the larva; this fly was, however, in a crippled condition, and soon perished. Search in stored apples in various parts of the district also revealed occasional fruit fly larvæ and pupæ; in every case these were found in the packing shed, or underneath the house; such situations affording as they do shelter from frosts. A small percentage of maggots and pupæ are thus enabled to survive, and it is probable that a few may pass the winter in this way, the adult flies emerging in the spring. Many experiments are being carried out with such fruit and we shall be able to state definitely, later on, if this is the case or not.

Adult Fruit Fly.

No fruit flies, with the exception of the single instance abovementioned, have hatched during the months of June and July; and it is, I think, unlikely that many examples of *Chætodacus tryoni* can live as adult fruit flies throughout the Granite Belt winter.

Field Experiments.

On 27th June, 1923, fruit fly puparia, 100 in number, which had been buried on 5th May, 1923, in loose soil, at a depth of 2 in., were dug up and examined; all were found to be dead. This was also found to be the case with pupæ buried at a depth of 6 in.

On the other hand, under infested fruit which had been placed on the surface of the ground, and covered with fly-proof gauze, one living fruit fly pupa was discovered. The soil has been sifted under fruit trees which carried maggot-infested late fruit (such fruit being allowed to fall on the ground) but no fruit fly pupæ, dead or alive, have been met with.

In several such experiments as the above, the gauze covers used will remain untouched until the spring, when a careful watch will be kept, for possible fruit flies, which (should they winter in this manner) ought to emerge about October. This wintering, or over-wintering of the Queensland fruit fly in the Granite Belt, is a question of very great importance. Should it migrate by flight into this district every spring (which I think extremely unlikely) its control will prove very difficult indeed. Should it, on the other hand, winter here with us in the maggot or pupa stage, its control should be quite possible, and merely a matter for organised effort.

Co-operation with New South Wales.

On 3rd July, Inspector J. Lindsay, of New South Wales, visited Stanthorpe, and was shown the experiments being carried out here, and the matter of fruit fly control was discussed.

Maggots in Imported Fruit.

On 12th July, living fruit fly maggots were found to be present in imported citrus fruits. This matter was brought to my notice by Mr. McGan, of Stanthorpe, and was at once reported to the Entomologist in Chief, who directed urgent attention to the same. It is, I need hardly state, most important to obviate all risk of a recurrence of this happening, as we are most desirous of securely closing this possible avenue of fruit fly introduction to the Stanthorpe district.

Cold Storage.

Experiments are to be conducted in Brisbane (as has been suggested) by the Department of Agriculture, to ascertain the exact period and temperature required to kill the maggots and pupæ of the Queensland fruit fly (*Chætodacus tryoni*), and it is more than possible that a very much shorter period than the twenty-one days now stipulated will be found sufficient. Should this be so, it will be of the utmost importance not only to fruit agents but also to Stanthorpe fruitgrowers.

Packing Sheds.

A general clean up of packing sheds has been, and is still being proceeded with, and I must strongly urge all growers to see that no shelter is given to the fruit fly, and incidentally to other insect pests. Too much care cannot be exercised in this matter, and a couple of days spent in thoroughly cleaning up the packing shed now, may save much loss and worry later on.

OTHER INJURIOUS INSECTS.

Woolly Aphis of Apple.

On 24th May (in reply to my application) a letter was received from Dr. R. J. Tillyard, M.A., of the Cawthron Institute, New Zealand, promising a consignment of the Woolly Aphis parasite (*Aphelinus mali*) for this district; and on the 14th of this month, another letter was received informing me that the promised consignment of beneficial insects would leave Wellington, New Zealand, on 20th July. This useful insect was introduced into New Zealand by Dr. R. J. Tillyard in 1921, and owing to his great care and skill in rearing same it is now well established in New Zealand, and is doing very good work against the Woolly Aphis (*Shizoneura lanigera*) so harmful an apple pest. During 1922, Dr. Tillyard distributed (as he informs us) 33,000 living aphelinus parasites, to different parts of New Zealand—by post. As regards the life history, &c., of this useful insect, Dr. Tillyard states as follows:—

"*Description.*—This parasite is a tiny chalcid wasp measuring about 1/25 of an inch in length. In shape it is somewhat like a honey bee, but the colour is blackish except for a yellowish band round the base of the abdomen, and another on the antennae. It is an active little insect, and can both jump and fly quickly. The males can be recognised by being slightly smaller and less stoutly built than the females.

"*Life History.*—Immediately on emerging from the chrysalis or pupa the males and females pair. After pairing the male lives only a few days, but the females may live a week or longer. The female begins to search vigorously for Woolly Aphis and proceeds to lay her eggs in them one by one, by stabbing them her sharp ovipositor, at the same time inserting one egg in each aphis. The aphis objects to this, squirms, and often exudes a drop of liquid. In a few days' time, the tiny wasp grub hatches, and proceeds to devour the whole of the internal organs of the aphis, which contains just enough food to bring the grub to full size. When full grown, the grub hardens the shell of the dead aphis into a kind of cocoon, within which it turns to a pupa. After a varying period of time spent as a pupa, the aphelinus emerges as the perfect insect and pairing again takes place.

"During warm summer weather, the complete life cycle of the parasite is gone through in five or six weeks, so that from four to six broods a year can be raised in a fairly warm climate.

"As each female lays fifty or more eggs, the rate of increase is very great, and the parasite is able to catch up with the aphis, and entirely overtake and destroy it before the end of the season. The aphelinus will attack any of the dark-coloured aphids, such as the Black Aphis of citrus trees, and has been known to attack young mealy bug."

All arrangements have been made for the reception and breeding of this parasite, on its arrival, which should be within the next few days.

CODLING MOTH OF APPLE.

The general cleaning up of packing sheds already alluded to has been beneficial in considerably reducing the numbers of this pest. The importance and necessity of this cleaning up was stressed by the Government Entomologist, Mr. H. Tryon, and the Chief Instructor in Fruit Culture, Mr. J. M. Ward, at a meeting of the Stanthorpe District Fruitgrowers' Council, held in Stanthorpe on 28th July. So important did they consider the control of Codling Moth that Mr. Tryon and Mr. Ward made a special visit to Stanthorpe for the express purpose of addressing the Council on this matter. The valuable information and advice given by both the Government Entomologist and the Chief Instructor in Fruit Culture, in relation to the Codling Moth and its control, should prove very helpful. Right spraying, with the right spray at the right time, will undoubtedly have a control of this serious fruit pest.

MISCELLANEOUS.

Tomato Caterpillar.

The injurious caterpillar of the tomato alluded to in my last report has since given rise (in the Insectary) to a small moth. This moth, of which I have so far two examples, emerged from the chrysalis on 25th July.

These caterpillars were obtained on 4th May. On 14th May they assumed the chrysalis form with a web cocoon, the moths emerging on the 25th July.

If this is the normal hatching time of the moth, we might expect another brood in early spring.

The insect has been sent to Dr. H. Jefferis Turner, of Brisbane, for identification.

Fungus Diseases.

Specimens illustrative of fungoid diseases affecting fruit trees, were, through my agency, secured by Mr. Tryon, the Government Entomologist and Pathologist, on his recent visit to Stanthorpe, and were taken by him to Brisbane for identification.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JULY, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JULY, 1923 AND 1922, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	July.	No. of Years' Records.	July, 1923.	July, 1922.
North Coast.	In.		In.	In.
Atherton	0·96	22	0·52	2·24
Cairns	1·63	41	0·39	2·50
Cardwell	1·47	51	0·57	2·05
Cooktown	0·99	47	0·16	0·55
Herberton	0·73	36	1·01	2·21
Ingham	1·66	31	0·54	2·20
Innisfail	4·74	42	2·95	3·55
Mossman	1·61	15	0·05	2·34
Townsville	0·60	52	0·09	1·48
Central Coast.				
Ayr	0·72	36	0·06	2·10
Bowen	0·98	52	0·47	2·40
Charters Towers ...	0·67	41	0·16	3·99
Mackay	1·76	52	1·19	4·66
Proserpine	1·46	20	0·04	2·50
St. Lawrence ...	1·31	52	1·45	3·83
South Coast.				
Biggenden	1·36	24	0·79	2·58
Bundaberg	1·95	40	0·90	3·33
Brisbane	2·31	72	2·05	4·68
Childers	1·71	28	1·00	2·59
Crohamhurst ...	2·32	30	4·57	3·26
Esk	2·03	36	1·14	2·89
Gayndah	1·52	52	1·29	3·16
Gympie	2·18	53	2.81	2·64
Glasshouse Mts. ...	2·55	15	*	4·55
Kilkivan	1·71	44	1·50	2·21
Maryborough ...	1·96	52	2·87	2·47
South Coast—continued:	In.		In.	In.
Nambour	2·75	27	4·88	3·45
Nanango	1·79	41	1·29	2·53
Rockhampton ...	1·63	52	0·35	3·20
Woodford	2·52	36	2·82	2·66
Darling Downs.				
Dalby	1·82	53	0·23	1·81
Emu Vale	1·64	27	0·96	2·50
Jimbour	1·71	35	0·41	1·67
Miles	1·78	38	0·49	0·95
Stanthorpe ...	2·08	50	1·57	3·30
Toowoomba ...	2·09	51	0·99	3·55
Warwick	1·85	58	0·97	3·08
Maranoa.				
Roma	1·51	49	1·08	0·72
State Farms, &c.				
Bungeworgorai ...	1·73	9	1·13	0·54
Gatton College ...	1.47	24	0·61	2·12
Gindie	1·12	24	0·42	0·73
Hermitage ...	1·87	17	0·74	2·96
Kairi	1·36	9	0·51	2·73
Sugar Experiment Station, Mackay	1·62	26	0·74	4·37
Warren	1·41	9	0·75	2·50

* Return not received.

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for July this year, and for the same period of 1922, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
State Meteorologist.

THE CITRUS BUG *(ONCOSCELIS SULCIVENTRIS).*

GOVERNMENT ENTOMOLOGIST'S REPORT.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has received the following report from Mr. Henry Tryon, Government Entomologist and Vegetable Pathologist, dated 6th August, 1923:—

"With reference to the investigations bearing on the control of the Citrus Bug *(Oncoscelis sulciventris)*, an insect so prevalent of late seasons throughout the Blackall Range district, initiated by myself (*vide* 'Notes on the Citrus Orange Bug,' 'Queensland Agricultural Journal,' February, 1923, pp. 103-109), and since been prosecuted by the Assistant Entomologist, Mr. A. A. Girault, I may set forth the position that has now been arrived at.

"When the inquiry commenced, citrus-growers pointed out that each year in spring yellow-coloured nymphal bugs of fairly large size were met with, and that the insect was absent from the orangeries during the preceding winter months, and that the problem was to find out where it existed whilst this absence occurred, and to attack it there (if discoverable).

"In the course of our initial investigation we were able to point out a phase in the life history of the orange bug that had been previously overlooked, and to suggest that its apparent absence was to be explained by this fact.

"This phase was one exhibited by the young insect within a week of its hatching from the egg, when it transformed into a thin flat oval-shaped bug, measuring about 7 millimetres in length, coloured as was the under-leaf surface, and occurring singly in this situation dispersed throughout the foliage so as to be practically invisible.

"Mr. Girault, resuming investigations about midwinter, soon discovered that this was exactly what happened—that these peculiar second-stage bugs were present in numbers, and that, although, as had been previously discovered, they clung to their leaf support with some pertinacity, still they could be brought to the ground by concussion of the tree effected by the employment of a wooden mallet.

"Also, that every individual little orange bug brought to the ground sooner or later crawled to the trunk of the tree whence it had fallen, and then commenced to proceed up it to regain the foliage on which it formerly occurred, this observation indicating that it could be disposed of either when on the ground or on its finding its way from it upwards to the branches, when it could be trapped.

"In still later experiments Mr. Girault demonstrated that it happened that a single operation of hammering the tree and its branches might not cause all the insects to detach themselves. He accordingly prosecuted investigations in which different more or less pungent smokes were used, possibly for securing this desired end.

"It was found, however, that when caused to diffuse through the foliage in an unenclosed space their potency was not sufficient to accomplish their downfall. (*Note.*—It is already known that, as in the case of all insects, this may be effected by fumigating with hydrocyanic gas, using a close tent as in scale-insect destruction.)

"That the discovery of this over-wintering stage on the development of the Orange Bug, and of its comportment when in this stage on being brought to the ground, affords a ready means of even capturing the insect in numbers at a time of the year when it was supposed to be absent, will appear from a single result in which this has been availed of.

"In this case the orchardist, Mr. V. G. Pack, of Montville, operating with a padded mallet on a young bug-infested orange tree of about six to seven years of age, used ordinary fly-paper (made with boiled linseed oil, &c.), and forwarded the catch, which on being examined was found to comprise of no less than 3,650 examples of these small flat green young Orange Bugs.

"In the course of further experiments than those alluded to and that have not yet been prosecuted beyond quite initial stages, Mr. Girault being assisted by Mr. J. H. Simmonds, B.Sc., an inquiry has been made into the efficiency of spray fluids in destroying these little insects. Eight different ones, including certain proprietary contact insecticdes, have been tested.

"Of these, some have been found to be quite useless; others, such as Black Leaf 40, nicotox and resin plus kerosene emulsion, have proved fatal when brought into contact with the insects by spraying, lime sulphur wash proving also effective but having a slower action.

"In operations, however, on an orangery scale it will be found very difficult to reach individual insects, owing to their habit of living on the under-leaf surfaces and their occuring generally scattered throughout the foliage.

"These investigations are still in progress. Meanwhile allusion may be made to the general situation. I may thus remark that (1) as compared with fruit fly and certain scale insect attack the Orange-tree Bug is a minor citrus pest. Also, that (2)

its subjugation singularly lends itself to co-operative effort, and is, moreover, a proper object for such effort.

"Those whose orangeries are infested by the insect owe this to the fact that their trees have been originally visited by the winged insects from without, an incident that may have befallen every other citrus cultivation in the district that may so far have escaped visitation, and moreover, in pursuing repressive measures, they are not alone ministering to their own interest as growers, but what is more important adopting procedures that must in the end remove a danger that threatens the trees of their neghbours, who otherwise might derive an incursion of bugs from the source that their infested trees supply. In the local Fruitgrowers' Associations acting in unison we have the machinery for effecting this necessary concerted action."

EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JULY, 1923.

The weather conditions during the month were not satisfactory, the cold winds had a bad effect on the fowls. The laying of the heavy breeds improved considerably during the last week. A performance of note was the laying of Mr. W. Becker's Langshans, their score for the month being 140 eggs. Mr. R. Burns follows in the heavy breeds with 131 eggs. In the light breeds, Mr. C. H. Singer heads the list with 136 eggs, Messrs. W. and G. W. Hindes taking the second place with 127 eggs. The following are the individual scores:—

Competitors.	Breed.	July.	Total.
	LIGHT BREEDS.		
*C. H. Singer	White Leghorns	136	477
*W. and G. W. Hindes	Do.	135	457
*N. A. Singer	Do.	134	455
*S. L. Grenier	Do.	116	425
*Ancona Poultry Club	Anconas	127	424
*Oakleigh Poultry Farm	White Leghorns	125	416
*Rock View Poultry Farm	Do.	115	403
*O. Goos	Do.	111	395
Jas. Hutton	Do.	104	394
*Beckley Poultry Farm	Do.	115	390
F. Sparsholt	Do.	126	387
*J. W. Newton	Do.	101	381
*Mrs. L. Andersen	Do.	124	374
*J. M. Manson	Do.	114	368
*J. W. Short	Do.	112	366
*R. C. J. Turner	Do.	105	357
G. Marks	Do.	103	353
*Bathurst Poultry Farm	Do.	102	352
*H. P. Clarke	Do.	112	348
*Geo. Williams	Do.	107	342
*Arch. Neil	Do.	110	337
G. E. Rogers	Do.	100	337
Jas. Harrington	Do.	94	334
*A. C. G. Wenck	Do.	104	330
*Mrs. R. E. Hodge	Do.	107	327
*C. A. Goos	Do.	114	320
*H. Fraser	Do.	103	314
W. A. and J. Pitkeathly	Do.	100	313
W. Becker	Do.	97	297
C. Quesnell	Do.	103	292
Jas. Earl	Do.	85	291
Chapman and Hill	Do.	100	283
W. and G. W. Hindes	Brown Leghorns	102	287
*Mrs. E. White	White Leghorns	91	270
*J. Purnell	Do.	119	263
E. Ainscough	Do.	90	258
Parisian Poultry Farm	Do.	101	241
*N. J. Nairn	Do.	111	229

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	July.	Total.
HEAVY BREEDS.			
*W. Becker	Chinese Langshans ...	140	454
*R. Burns	Black Orpingtons ...	131	429
*Jas. P tter	Do.	130	413
*Jas. F rguson	Chinese Langshans ...	121	411
*Jas. Hutton	Black Orpingtons ...	117	411
*Mrs. A. F. Gallagher	Do.	125	410
J. R. Douglas	Do.	118	399
*E. Walte	Do.	118	383
*H. M. Chaille	Do.	122	376
*E. F. Dennis	Do.	127	375
*Mrs. A. Kent	Do.	120	372
R. Conochie	Do.	101	367
*T. Hindley	Do.	123	346
*R. Holmes	Do.	118	345
*Parisian Poultry Farm	Do.	115	342
W. T. Solman	Do.	105	342
Beckley Poultry Farm	Black Orpingtons ...	93	336
G. E. Rogers	Do.	115	306
*J. H. Jones	White Wyandottes ...	96	304
Jas. Ferguson	Plymouth Rocks ...	101	301
*C. C. Dennis	Black Orpingtons ...	125	295
Rev. A. McAllister	Do.	100	294
H. B. Stephens	Do.	101	286
W. F. Ruhl	Do.	101	277
W. G. Badcock	Chinese Langshans ...	85	259
V. J. Rye	Black Orpingtons ...	100	245
F. J. Murphy	Do	90	167
Jas. Ferguson	Rhode Island Reds ...	72	163
Mos. Stephens	Black Orpingtons ...	63	124
Total		7,328	22,734

* Indicates that the birds are being tested singly.

DETAILS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
C. H. Singer	72	105	78	64	70	88	477
W. and G. W. Hindes	67	84	67	64	87	88	457
N. A. Singer	68	83	85	81	67	71	455
S. L. Grenier	64	71	79	71	73	67	425
Ancona Club	66	68	84	60	69	77	424
Oakleigh Poultry Farm	78	74	62	64	77	61	416
Rockview Poultry Farm	73	80	72	69	54	55	403
O. Goos	59	73	73	61	60	69	395
Beckley Poultry Farm	71	56	48	67	73	75	390
J. W. Newton	67	68	60	44	66	76	381
Mrs. L. Andersen	44	68	75	76	55	56	374
J. M. Manson	60	54	76	74	57	47	368
J. W. Short	57	65	56	71	65	42	366
R. C. J. Turner	54	61	59	63	48	72	357
Bathurst Poultry Farm	62	64	53	67	59	47	352
H P Clarke	70	34	68	52	63	61	348
Geo. Williams	71	71	41	53	55	51	342
Arch Neil	52	48	40	66	75	56	337
A. C. G. Wenck	56	45	56	59	47	67	330
Mrs. R. E. Hodge	46	55	44	66	62	54	327
C. A. Goos	53	72	50	56	43	46	320
H. Fraser	60	42	46	49	56	61	314
Mrs. E. White	39	41	60	49	41	40	270
J. Purnell	48	32	55	31	59	38	263
N. J. Nairn	53	25	49	39	31	32	229

EGG-LAYING COMPETITION—*continued.*

DETAILS OF SINGLE HEN PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
			HEAVY BREEDS.				
W. Becker	76	87	82	73	71	65	454
R. Burns	82	49	66	62	106	64	429
Jas. Potter	52	81	69	67	62	82	413
Jas. Ferguson	74	78	63	65	70	61	411
Jas. Hutton	75	74	79	65	60	58	411
Mrs. A. E. Gallagher	66	78	68	69	64	65	410
E. Walters	80	83	57	55	52	56	383
H. M. Chaille	60	74	71	68	46	57	376
E. F. Dennis	78	59	57	58	70	53	375
Mrs. A. Kent	58	87	58	81	54	34	372
T. Hindley	59	71	70	70	39	37	346
R. Holmes	55	47	56	50	64	73	345
Parisian Poultry Farm	24	52	65	71	67	63	342
J. H. Jones	53	54	59	52	25	61	304
C. C. Dennis	51	60	33	50	49	52	295

CUTHBERT POTTS, Principal.

ZILLMERE EGG-LAYING COMPETITION FOR JULY.

During the month of July the laying in the competition at Zillmere, under the auspices of the National Utility Poultry Breeders' Association, has been very good, particularly in the Black Orpington section, which averaged almost twenty-two eggs per bird. The average for all the birds in the test was 19.77. Altogether 2,610 eggs were laid for the month. There was one case of broodiness noted (No. 93), but the health of the birds left nothing to be desired.

WHITE LEGHORNS.

Pen No.	Owner.	July.	Total.
62	Miss L. M. Dingle	26	103
75	W. Shaffrey	26	96
14	Enroh Pens	24	94
15	W. J. Berry	23	92
8	Oakleigh, P. F.	23	89
72	W. H. Forsyth	23	84
50	J. Harrington	24	83
27	H. T. Britten	21	82
65	R. Duff	23	82
66	R. Duff	21	82
61	Miss L. M. Dingle	22	81
64	S. Lloyd	21	81
81	J. E. G. Purnell	22	81
13	Enroh Pens	19	79
16	W. J. Berry	22	79
18	A. W. Ward	21	78
22	M. F. Newberry	22	78
33	A. S. Walters	22	78
41	W. Wakefield	21	78
76	W. Shaffrey	22	78
30	W. and G. W. Hindes	22	77
49	J. Harrington	19	77
51	Kidd Bros.	23	76
54	H. Holmes	25	76
7	Oakleigh, P. F.	22	75
28	H. T. Britten	23	75
3	T. H. Craig	19	73
4	T. H. Craig	25	73
43	Kelvin, P. F.	23	72
38	G. Williams	21	71
55	G. Baxter	21	71
59	G. Scaletti	23	71
70	R. Shaw	20	71
19	W. Witt	25	70
20	W. Witt	25	70
84	L. Andersen	23	70
42	W. Wakefield	20	69
26	E. Stephenson	20	68
69	R. Shaw	24	67
29	W. and G. W. Hindes	21	66
31	H. Needs	22	66
71	W. H. Forsyth	22	66
48	R. D. Chapman	8	66
1	Carinya P.F.	21	65
57	H. Fraser	20	65
45	F. R. Koch	23	64
63	S. Lloyd	22	63
73	A. Hodge	23	63
10	R. C. J. Turner	23	62
2	Carinya P.F.	22	61
37	G. Williams	20	60
36	J. T. Webster	20	59
56	G. Baxter	16	59
74	A. Hodge	21	59
11	A. Neil	23	57

ZILLMERE EGG-LAYING COMPETITION FOR JULY—*continued*.

WHITE LEGHORNS—*continued*.

Pen No.	Owner.	July.	Total.	Pen No.	Owner.	July.	Total.
12	A. Neil	23	57	67	J. and G. Green	13	42
40	J. Earl	3	57	32	H. Needs	6	40
53	H. Holmes	27	57	5	P. J. Fallon	5	39
77	W. Smith	21	56	21	M. F. Newberry	23	39
78	W. Smith	22	55	39	J. Earl	9	37
35	J. T. Webster	16	54	58	H. Fraser	25	36
23	Parisian P.Y.	21	52	47	R. D. Chapman	10	29
25	E. Stephenson	13	52	52	Kidd Bros.	23	23
83	L. Andersen	23	50	68	J. and G. Green	9	23
34	A. S. Walters	19	49	86	A. Cowley	13	21
44	Kelvin P.F.	20	47	60	G. Scaletti	15	19
85	A. Cowley	19	46	79	W. Bliss	7	18
6	P. J. Fallon	20	45	82	J. E. G. Purnell	17	18
17	A. W. Ward	21	45	80	W. Bliss	5	16
46	F. R. Koch	14	43	9	R. C. J. Turner	6	10
24	Parisian P.Y.	17	42				

BLACK ORPINGTONS.

Pen No.	Owner.	July.	Total.	Pen No.	Owner.	July.	Total.
95	J. Potter	26	109	105	W. Smith	20	66
92	J. Pryde	26	100	93	H. B. Stephens	19	64
112	H. Chaille	24	95	116	C. C. Dennis	25	62
115	C. C. Dennis	26	91	118	E. C. Raymond	20	61
119	J. Harrington	22	89	87	Parisian P.Y.	25	58
113	E. Walters	23	86	108	E. F. Dennis	20	58
109	T. Brotherton	29	85	106	W. Smith	18	56
120	J. Harrington	23	85	114	E. Walters	23	56
102	Enroh Pens	19	84	88	Parisian P.Y.	24	54
104	L. Pritchard	23	83	91	J. Pryde	25	52
96	J. Potter	24	80	94	H. B. Stephens	21	47
89	K. Macfarlane	27	79	99	S. Donovan	7	46
107	E. F. Dennis	24	76	90	K. Macfarlane	22	43
101	Enroh Pens	29	73	103	L. Pritchard	20	39
110	T. H. Brotherton	24	70	98	W. Shaffrey	6	29
111	H. M. Chaille	25	69	100	S. Donovan	19	28
117	E. C. Raymond	23	68	97	W. Shaffrey	4	16

OTHER VARIETIES.

Pen No.	Owner.	July.	Total.	Pen No.	Owner.	July.	Total.
131	W. H. Forsyth (S.W.)	26	94	121	Parisian P.Y. (B.L.)	15	24
128	A. S. Walters (B.R.)	24	83	124	J. Ferguson (Ancona)	17	24
126	J. Ferguson (Lang.)	20	80	130	R. A. Girling (Min.)	0	22
125	J. Ferguson (Lang.)	24	68	129	R. A. Girling (Min.)	9	13
122	Parisian P.Y. (B.L.)	24	51	132	W. H. Forsyth (S.W.)	0	0
123	J. Ferguson (Ancona)	19	40				
127	A. S. Walters (B.R.)	14	37			2,610	8,061

ORANGE WINE.

Mr. W. H. Harvey, of Montville, courteously supplies the following recipe for making orange wine:—

To make 10 *gallons.*—Use a keg of that capacity and squeeze sufficient oranges for 2½ gallons of juice; add 2½ lb. of sugar to the gallon, say 25 lb. to 10 gallons. Keep all pulp in separate tub, add cold water to this and let it remain for twenty-four hours; then strain and add to juice and sugar. Add more water to pulp to the quantity required and let it stand for twenty-four hours. Then strain and fill up keg. Keep the keg filled up with cold water, and, when finished working, bung up airtight and let the wine remain for twelve months. I use small-grade fruit, windfalls, and Sevilles just as they come.

PLATE 41.—THE GRAND PARADE OF STOCK, ROYAL NATIONAL EXHIBITION, BRISBANE, 1923.

ROYAL NATIONAL EXHIBITION.

THE WEALTH OF QUEENSLAND'S BROAD ACRES—A PAGEANT OF PROSPERITY—A REPRESENTATION IN MINIATURE OF THE RURAL RICHNESS OF A FORTUNE-FAVOURED STATE—A TRIUMPH OF ORGANISATION AND ACHIEVEMENT.

The Annual Brisbane Exhibition is rightly regarded as a microcosm of the State—a small-scale representation of the rural industries of a realm. This year's great display, in infinite variety, of the products of the soil was convincing evidence of Queensland's immense agricultural and pastoral capacity, and a striking reflex of the richness of her forests, fields, and pastures.

Possessing a remarkable range of soil and climate, Queensland is probably the most richly endowed State of the Commonwealth, and the great Annual Show in the capital provides a fitting stage for the presentation of her products and the parade of the pick of her flocks and herds. The 48th Annual Show of the Royal National Agricultural and Industrial Association of Queensland, held at Brisbane on 6th to 11th August, was a conspicuous success. On each day attendances were very large, and on the official opening day 75,000 people congregated on the ground. In weather and everything else the Association was well favoured. The district and one-farm exhibits were outstanding features. Other leading pavilion features were the court of the Department of Agriculture and Stock and displays of the products of our staple primary industries, forestry, fruits, and motor vehicles. Queensland's great new industry, cotton-growing, was well illustrated, and the cotton court was a centre of attraction throughout the week. In the arena were paraded stock that would win attention and commendation in any show ring. All the leading dairy breeds were strongly represented, and visitors from other States were most favourably impressed with the quality of the cattle that passed under review. Good horses are an attraction at any Queensland Show, and the stud classes presented for judgment were full of quality. Each day the six fine Clydesdales, purchased by the Government for service in farming districts, were paraded, and the police remounts from the Government Remount Station were equally popular. Generally, this year's exhibition, strong in every feature, was worthy of the State and the great primary industries which the National Association lives to foster.

THE AGRICULTURAL COURT.

REPRESENTATION AND REVIEW OF DEPARTMENTAL ACTIVITIES.

This year's display of the Department of Agriculture and Stock was designed for the express purpose of illustrating the activities of the various branches of the Department. In the arrangement of such a comprehensive assortment of exhibits, their educational value was closely studied.

As Queensland is on the eve of launching a large land settlement scheme in the Upper Burnett and Callide Valley districts, prominence was given in the court to cotton, for this crop is destined to be one of the most favoured for establishing pioneer settlers, and in this Queensland offers a magnificent field for development. Queensland's cotton future is bright. Two hundred and thirty-four thousand pounds sterling was paid to cotton-growers for the crop just ginned under the terms of the Government guarantee; seed cotton produced during the year exceeded 10,500,000 lb. weight.

A notable feature of the cotton exhibit was a display of piece goods manufactured in England from Queensland-grown cotton, a consignment of which only reached Brisbane a few days before.

In the fruit section a special effort was put forth to demonstrate special methods of packing citrus fruit specially graded for the purpose.

Included in a wide range of court exhibits were trophies and displays of sugar-cane, wool, grasses and edible shrubs, and agricultural exhibits of many kinds, including an illustration of the activities of the Pure Seeds and Stock Foods Section. Special exhibits of maize, wheat, stock foods, cotton, and fruits were artistically staged.

The Stock Experiment Station, Yeerongpilly, and the Entomological and Plant Pathological sections of the Department also contributed highly educational evidence of the alliance of Science with Agriculture.

QUEENSLAND'S WEALTH IN WOOL.

Queensland's wealth in wool was well illustrated in the Departmental Court. The exhibit this year was designed as mainly instructional in the direction of

PLATE 42.—HIS EXCELLENCY THE GOVERNOR-GERERAL, LORD FORSTER, OFFICIALLY OPENING THE EXHIBITION.

technical explanations of the various classes. The officers of the Department responsible arranged a set of cards showing the transition of wool from the greasy state right through the various processes up to the manufactured cloth.

A new feature illustrated the term ''yield.'' This term is a technical expression of a leading factor in buying wools, and means the clean scoured product of any sample of wool. The greatest proportion of wool sold in Australia is in the greasy state, and the buyer has to make an estimate on the valuing floor of the clean scoured ''yield'' of any sample bales placed before him. Six parcels of wool were selected, and half of each was scoured clean and dry. They were placed together and the ''yield'' shown. This work was done at the Technical Wool School, Brisbane. Appropriate figures were shown on each parcel.

Representative fleeces of high quality were also shown, and gave a good idea of the quality of Queensland wools demonstrated to such advantage during the appraisement era. Next to Tasmania, Queensland wools averaged the highest price per lb.—16.72 pence—while the flat rate for all the Australian wools was 15½d. per lb.

Samples of Corriedale and other long wool breeds were also shown, with cases containing small samples of very high quality. Panels of black and white wools were merely decorative and conveyed no special information.

QUEENSLAND'S RICH NATURAL PASTURES.

Queensland has always had a high reputation for the richness of its natural pastures, and the comprehensive collection of native grasses and forage plants staged by the Department bore testimony that the reputation is well founded. Among the Andropogons are the far-famed Queensland Blue Grass and Satin Top. The former is one of the most palatable and fattening grasses we possess, but is not particularly drought resistant and is easily eaten out with the consequence that many blue grass pastures have deteriorated during recent years as a result of heavy stocking. The genus Astrebla contains the well-known Mitchell Grasses, of which Queensland possesses four distinct kinds, more than any other State. The drought-resistant qualities of these and other grasses of the West are well known, a characteristic being their rapid recovery after rain. Among the Star Grasses, to the same genus of which belongs the imported Rhodes Grass, are several highly esteemed for their

PLATE 43.—THE MINISTER (HON. W. N. GILLIES) IS INTERESTED.

fodder value. The genus Anthistiria contains the well-known Kangaroo Grass and the Tall Oat Grass. Closely allied to these is the Flinders Grass (*Isielema*), one of the most nutritious grasses probably extant and relished by stock when dry as well as green. It is a mass of grain heads, hence, no doubt, its high nutritive value. One of the largest genera of grasses is the genus Panicum, of which quite an array of species were shown. They are mostly of high value and occur in mixed pastures rather than in pure stands. One of the best is the Shot Grass (*Panicum globoidcum*), which bears long spikes of shot-like grain, and is therefore exceedingly nutritious. Among other grasses shown were some especially adapted for wet and swampy situations, such as Rice Grass, Swamp Couch, Water Couch, *Panicum obseptum,* and *Panicum proliferum.* Button Grass, Crow's Foot, native paspalums, and sorghums, and other grasses all found a place in this comprehensive array.

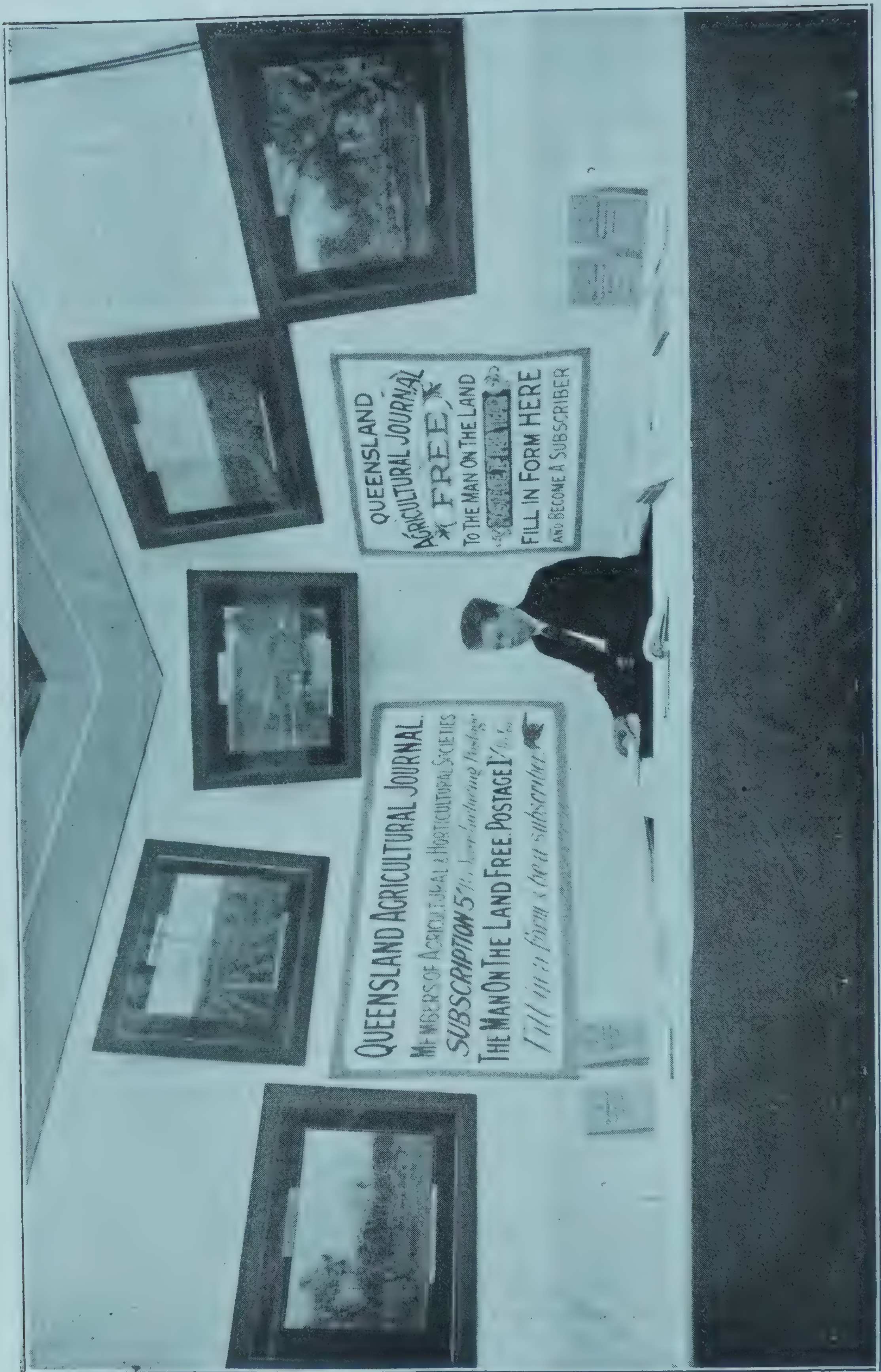


PLATE 44.—THE "JOURNAL" CORNER—COURT OF THE DEPARTMENT OF AGRICULTURE AND STOCK.

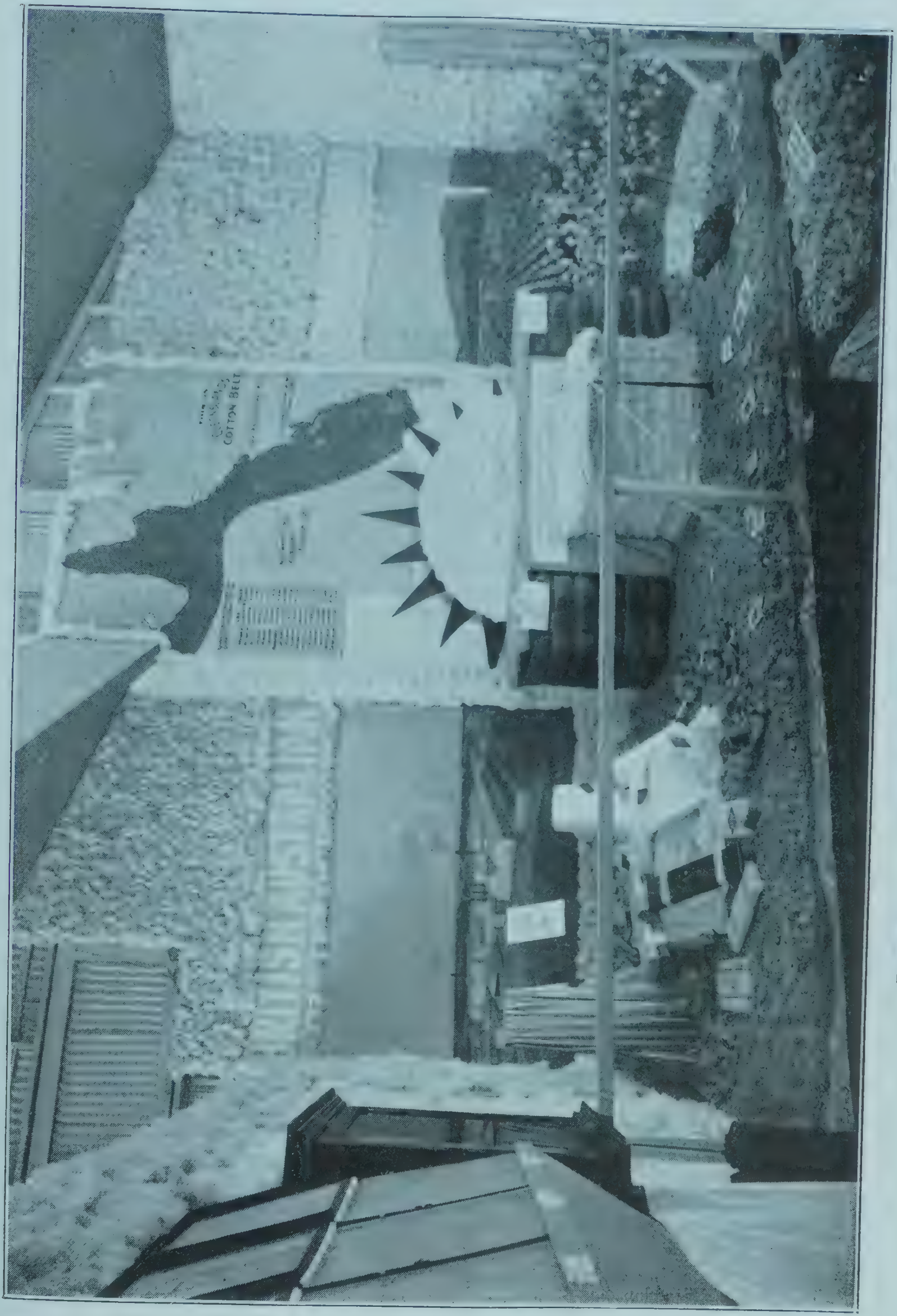


PLATE 45.—A VISION OF QUEENSLAND'S TEXTILE FUTURE.
Exhibit of The Australian Cotton Growers' Association, Royal National Exhibition, Brisbane, 1923.

EDIBLE TREES AND SHRUBS.

Among the more remarkable and valuable features of Australian vegetation is the number of trees and shrubs, particularly in our open western country, that may be used as food for stock. The collections shown of about thirty sorts proved interesting and instructive to pastoralists, stockowners, and farmers generally. Among the many varieties displayed were the Mulga, Kurrajong, Apple Tree, Wild Orange or Bumbil, Beelah, Emu Bush, Whitewood, Myall, Cattle Bush, Red Ash, and Broad-leaved Sally. All these and others have helped to keep cattle alive and in good condition during long spells of dry weather. The propagation, conservation, and utilisation of these valuable trees is a matter of national importance. The Botanical Division of the Department is always willing to report on any samples of plants sent for identification and information by farmers, pastoralists, or others interested.

THE SUGAR INDUSTRY.

DISPLAY BY THE BUREAU OF SUGAR EXPERIMENT STATIONS.

A number of new varieties of cane grown at the Bundaberg Sugar Experiment Station were staged in the Agricultural Court. These comprised canes from Mauritius, Fiji, Barbadoes, Demerara, and New Guinea. Other varieties shown were raised in Queensland. Full descriptions of these appeared upon the cards attached to the canes, which also gave their commercial cane sugar content. Many of these canes are at present undergoing chemical and field tests, while others have passed the probationary period and are being distributed to canegrowers. These latter varieties, however, comprise only a fraction of the number of new and tested canes distributed from the Sugar Experiment Station in the course of the past twenty years. Prior distributions included such well-known canes as Badila and the Gorus, which are very largely grown in North Queensland. One of the principal objects of the Experiment Station is the constant introduction of new varieties and their commercial testing. Before any cane varieties are allowed to leave the Experiment Station they have to pass chemical and commercial trials through plant, first ratoon, and second ratoon crops. Each variety is tested not less than four times in the course of the sugar season, so that records are obtained giving farmers and millowners information as to whether canes are early or late, and as to whether their sugar contents are sufficiently high to warrant their adoption. This is combined with agricultural trials in the field, so that it may be determined whether such varieties are good croppers. They are further keenly watched for evidence of disease, and no affected canes are allowed to go into distribution. When varieties have passed these trials they are carefully examined and packed before being sent to growers living at a distance from the station. Farmers close at hand are permitted to visit the station and remove varieties selected for distribution. All canes are distributed free to canegrowers. The worthless varieties are discarded. Information of this kind could only otherwise be secured by growers and millers at the cost of much time and money, and the rejection of many useless canes by the mills, which would be accompanied by severe loss to the growers.

Sugar-cane Propagation.

In addition to the work recorded, the Experiment Station at Innisfail has now commenced work in the direction of raising cane from seed, and so far over 300 seedlings have been propagated.

Study of Soils, Cultivation, and Fertilising.

Work at the Experiment Stations also comprises the study of soils, cultivation, and fertilising. It is sought to introduce improved methods of cultivation, liming, fertilising, rotation of crops, and conservation of moisture, and growers are taught the principles of cultivation and business methods by visits to the Experiment Stations, and by lectures and addresses delivered in the various sugar districts, and by the issue of bulletins. It may be claimed that this work has been highly successful. The Sugar Experiment Stations analyse soils free for canegrowers, and give advice by personal interviews or by letter on the requirements of the soil in the way of application of lime where necessary, green manuring and fertilisers, and the treatment of the land by proper soil handling. Upwards of 1,000 cane soils have so far been

analysed. Cane samples are also tested free of charge, so that growers may know the best time in which to cut their cane. Field officers move around amongst farmers, giving advice on cultural operations.

Investigation and Research Work.

Investigation and research work in connection with the sugar cane's most serious pest—viz., the grub, is now being carried out by the Bureau of Sugar Experiment Stations in a systematic manner, and numerous bulletins have been issued upon the subject. The entomological laboratories are situated at Meringa, near Cairns, which is the centre of the worst grub-infested region in North Queensland. A chemical fumigant called para-dichlorbenzene has been successfully used during the past twelve months in the destruction of cane grubs.

Economic Value of Cane Cultivation—Its National Significance.

The work of the Sugar Experiment Station, in relation to its promotion of the agricultural welfare of Queensland in connection with the sugar industry, cannot be over-estimated. When it is considered that this industry is the greatest agricultural one in Queensland, and will produce a yield of 240,000 tons of sugar this year, estimated to be of the value of £6,500,000, it can be seen how highly necessary it is that it should be assisted and encouraged in every possible way. Apart from its economic value, however, it has a deep national significance, and has already played a very large part in peopling the North. According to the recent census, the increase in population in the last ten years in the Herbert Electoral Division was 19.4 per cent., or 14,929 persons—a greater increase numerically than in any other part of the Commonwealth.

THE SUGAR BELT.

Apropos of the sugar industry, it is to be noted, on reference to a map of the State, that the land in Queensland used for sugar-growing is included in a long, narrow, coastal belt. Parts of this belt are separated from each other by considerable tracts of non-sugar country. The latter, owing to a deficient rainfall or poorness of soil, are not utilised for cane. This belt is included between latitudes 16 deg. and 28 deg. south, and the bulk of the staple is grown within the tropics.

The bulk of the sugar soils can be stated to be from good to rich alluvial, such as river flats, with deep red volcanic soils of considerable depth. The nature of the country is generally designated "scrub" and "forest." The North Queensland scrubs are really jungles, carrying a thick growth of what is known as scrub timber, such as silky oak, bean, pender, kauri, silkwood, Johnstone River hardwood, interlaced with lawyer vine and other creeping plants, while the stinging tree is also conspicuous. Forest country usually consists of ironbark, bloodwood, Moreton Bay ash, blue gum, poplar gum, and acacia.

Rainfall.

The Queensland rainfall, fortunately, is highest during the summer period, at which time the cane plant makes its maximum of growth. The following are average rainfalls in the principal sugar-growing districts:—Cairns, 92.65; Johnstone River, 160.88; Herbert River, 84.91; Mackay, 66.67; Bundaberg, 44.40. Cane grows best when the relative humidity of the atmosphere is high, and this is the case during the wet season in Northern Queensland.

Queensland's sugar production in 1867 was 338 tons, and in 1917 307,000 tons.

The Greatest Agricultural Industry in the State—White Labour Production.

Australia is the only place in the world where cane sugar is produced by white labour. We are in competition with countries which produce sugar by black labour and under black-labour conditions. In Java, wages are only about 1s. per day, the worker keeping himself. Without protection through the tariff, or regulation of the price by the Government, it would be quite impossible for the Australian industry to survive.

About £15,000,000 are invested in the Queensland sugar industry. It is the greatest agricultural industry in the State. No other branch of agriculture in Australia employs so much manual labour.

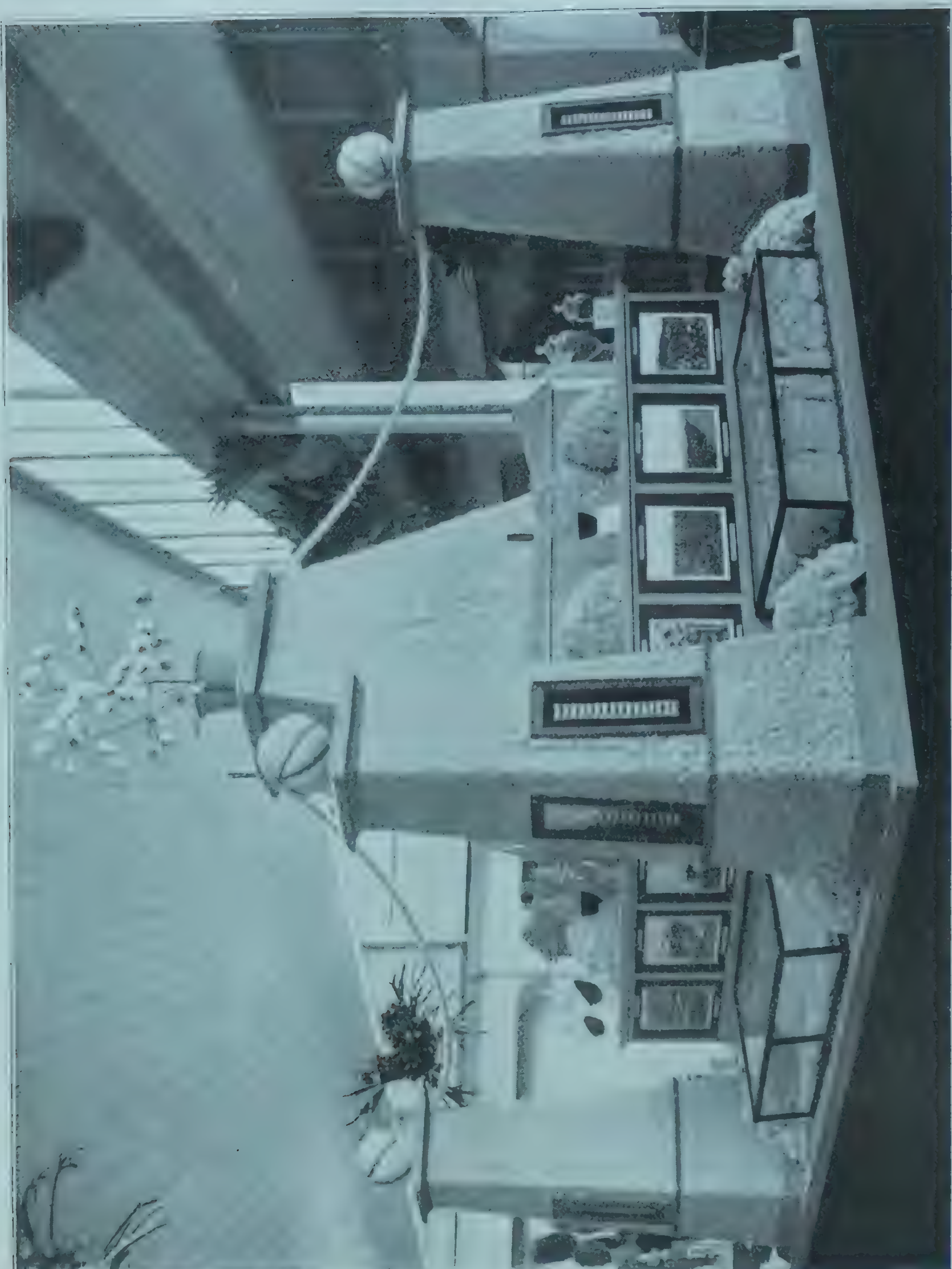


PLATE 46.—QUEENSLAND'S NEW INDUSTRY ILLUSTRATED—COTTON AND ITS PRODUCTS, CENTRAL TROPHY, DEPARTMENTAL COURT.

PLATE 47.—THE PRODUCE OF ONE WELL-WORKED FARM AT TEVIOTVILLE.

Mr. K. Haag's Winning Display.

PLATE 48.—ARRAY OF QUEENSLAND CANES, DEPARTMENTAL COURT.

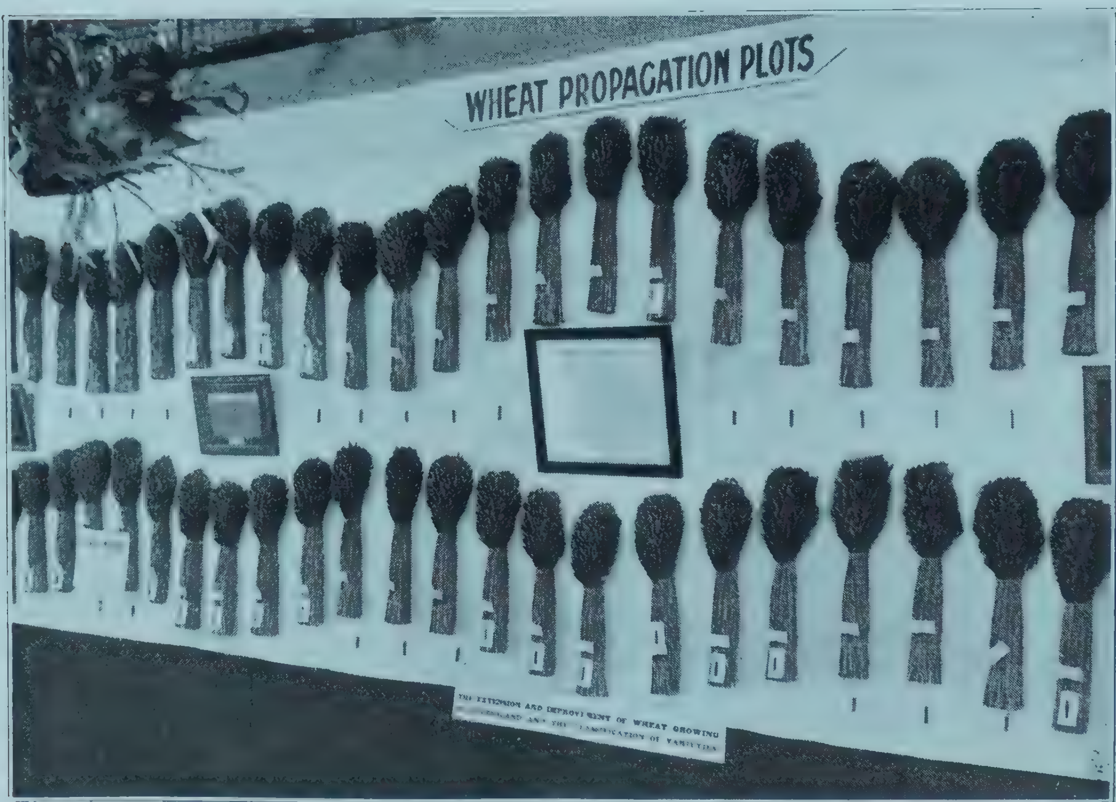


PLATE 49.—QUEENSLAND'S MARCH FROM A WHEAT IMPORTING TO AN EXPORTING STATE.
The Wheat Breeding Work of the Department of Agriculture and Stock illustrated in the Departmental Court.

PLATE 50.—QUEENSLAND'S GREAT WOOL INDUSTRY—DEPARTMENTAL DISPLAY OF TYPES AND CLASSES.

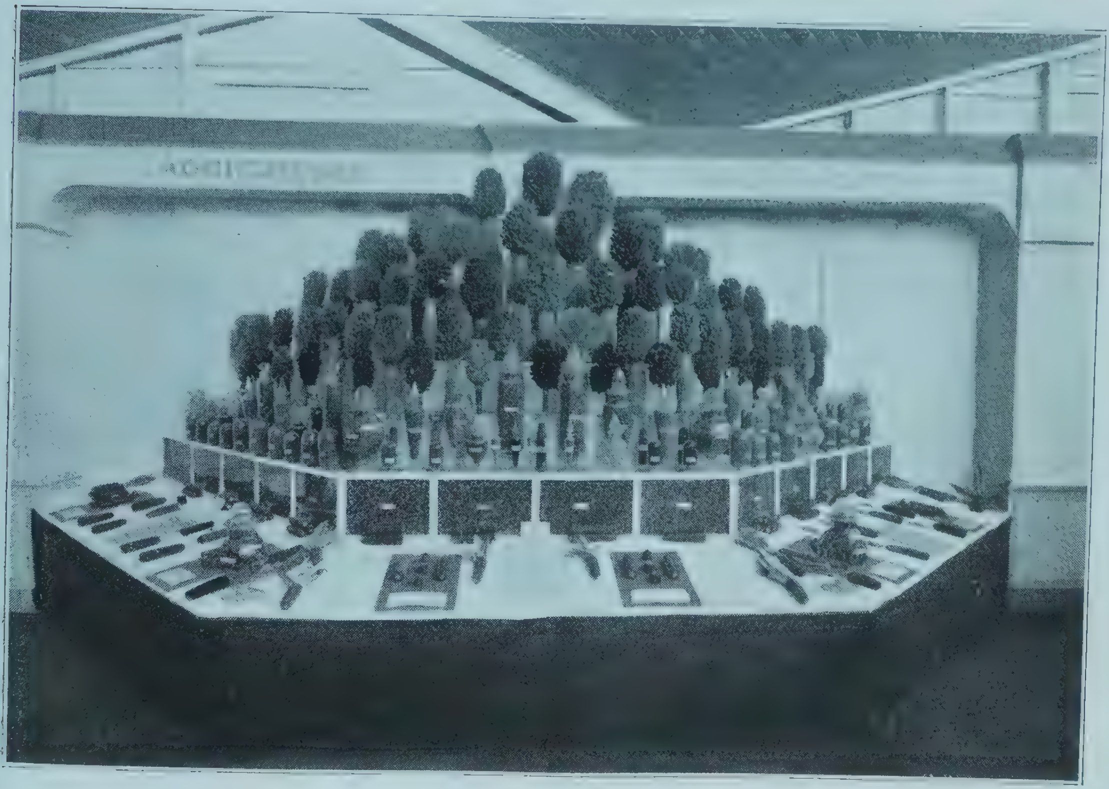


PLATE 51.—THE GRAIN TROPHY, DEPARTMENTAL COURT.

WHEAT.

The display of wheat this year emphasised the Departmental activities in the direction of the improvement of this important cereal. With the view of introducing to growers the improved qualities of wheats which have been raised at the Roma wheat-breeding farm, and demonstrating their qualities when grown under similar conditions to other varieties in general cultivation, propagation plots were established at the State farms and throughout the main wheat-growing districts. It is generally conceded that many of the varieties of wheats commonly grown can be improved upon in many ways, and that an improved standard would enhance the State's reputation as a wheat-growing country. Advantage has been taken of the organisation existing in the Department to carry on a comprehensive scheme for testing the varieties thoroughly before introducing them into cultivation. Provision also has been made for distributing seed wheat from the resultant crops to growers, and using the surplus for extending the cultivation of any particular variety which has proved superior to varieties now in cultivation.

MAIZE.

A practical illustration was placed before the public in the maize exhibit in the Agriculture Court of what the Department is doing in respect to the improvement in the type and yield of Queensland-grown maize. Work of this character has been carried out for a number of years, and at the same time to determine the suitability or otherwise of the several varieties to various districts. "Ear to row" tests and propagation plots are established each season in isolated areas, where there is no risk of cross-fertilisation taking place. Selections are made from these for further propagation work, and also for seed for distribution to farmers. Fresh varieties are being continually tried out, and only those that prove to be high-yielding varieties are kept. Included in this display were the following varieties, which have been grown for a number of years and have proved to be high-yielding strains.

Tested and Proved Varieties.

Improved Yellow Dent is a five to five and a-half months' variety, suitable for scrub lands and coastal districts, particularly on alluvial soils and where there is a good rainfall. This is a proved heavy yielder, having returned, under field conditions, over 100 bushels to the acre.

Golden Beauty is a medium late variety, taking from four and a-half to five months to mature, a heavy yielder, also a good fodder corn. A very hardy variety, and has a very high shelling percentage.

Star Leaming is a medium early variety, about four months, and one of the best of the early varieties. Very suitable for early or catch crops, and where there is a short growing season. Ears are very heavy and compact.

Reid's Yellow Dent is a four months' variety and a splendid yielder. This is also a suitable maize for districts where there is a short growing season, and is an excellent fodder corn. This season a plot of this variety yielded 96 bushels per acre from 4 acres.

Funk's Yellow Dent is another four months' variety, also a good yielder. Ears are weighty and very tightly packed. Like Reid's, it is suited for early crops, or districts which have a short growing season; also a good fodder corn.

Funk's 90 Day was imported two years ago by the Department, with the idea of securing a high yielding type to meet an insistent demand for a quick maturing variety. Excellent results have been obtained. The variety has proved to be a good yielder and an ideal variety for the purpose for which it was imported. It can also be recommended as a good fodder corn.

COTTON.

A very fine educational exhibit of cotton was arranged. It included instructive texts on the culture of the shrub and the picking of cotton. Open bolls were shown to illustrate the proper and improper stages at which seed cotton should be picked, and sets of standards representing the grades of the seed cotton as it has been picked this year were on view. Varieties of cotton were arranged to show the size of boll and length of lint. Explanatory and descriptive matter relating to the merits and value of the lint of these varieties was also set out. There were also exhibits illustrating the length of staple of various cottons, and samples of cotton in the various forms from seed cotton to the manufactured product. Cotton seed and the by-products of cotton seed, dress goods manufactured from Queensland cotton, and literature and photographs relating to cotton-growing in Queensland were included in the display.

QUEENSLAND FRUITS.

It is some years since the Fruit Branch of the Department put up a fruit exhibit as a contribution to the Departmental display. This year, however, a very interesting and instructive exhibit was arranged. This comprised a number of cases of fruit, chiefly citrus, displayed to illustrate correct methods of grading and packing fruit in the new citrus case. Various packs were displayed, showing how the first, second, third, fourth, and last layers are packed, each layer being packed by itself in a single tray, gradually working up to the finished case.

Each pack depended entirely upon the size and grading of the fruit, and the latter was done with a variation of $\frac{1}{4}$ in., 2 in., $2\frac{1}{4}$ in., $2\frac{1}{2}$ in., $2\frac{3}{4}$ in., 3 in., $3\frac{1}{4}$ in. It is laid down that a 2-in. orange or other fruit is a 2-in. one until the $2\frac{1}{4}$-in. size is reached, after which it becomes the $2\frac{1}{4}$-in. size. By this simple calculation no grower may go wrong with grading and packing his fruit, but the importance of grading cannot be too strongly stressed if good packing is to result. Each case shown was explanatorily labelled.

On the pack now being taught by officers of the Department the number of fruits is marked upon the case so that the buyer may know exactly how many he is purchasing.

To citrus and other growers the display was a valuable object-lesson.

ENTOMOLOGY.

The Entomological Section of the Department of Agriculture prepared a display of insects of general economic importance. The life history and damage of each of these were fully illustrated in twenty-seven excellently set-up cases, the work of Messrs. E. and H. Jarvis, under the direction of Mr. H. Tryon, entomologist in chief.

Cotton.

On account of the bright prospects of the cotton industry, the insects which affect this crop are perhaps the most interesting to the general public. In the cases containing these were shown the more important pests with which our cotton-growers may

PLATE 52.—THE ENTOMOLOGICAL EXHIBIT, DEPARTMENTAL COURT.

PLATE 53.—MORETON, THE WINNING DISTRICT EXHIBIT, "A" GRADE, ROYAL NATIONAL EXHIBITION, BRISBANE, 1923.

PLATE 54.—THE KINGAROY EXHIBIT, ROYAL NATIONAL EXHIBITION, BRISBANE, 1923.

PLATE 55.—THE WEALTH OF QUEENSLAND'S WOODS—OBJECT LESSONS IN ECONOMICAL FORESTRY.

Display of the State Forest Service, Royal National Exhibition, Brisbane, 1923.

PLATE 56.—QUEENSLAND'S RICH NATURAL PASTURES. THE DEPARTMENTAL DISPLAY.

have to contend. Firstly, there were the small moths, the larvæ of which attack the young branchlets and immature bolls—namely, the Rough Boll Worm and the Spotted Boll Worm. Then the "cotton worm," which damages the young squares, causing these to die and fall off, and the pale green leaf-eating caterpillar of "Cosmophila," the "Harlequin Bug," and the two cotton stainers completed a very enlightening exhibit.

Fruit.

Of scarcely less interest was a comprehensive display of the Queensland fruit fly (dacus Tryoni). Paintings and actual specimens of each stage of the life cycle of this most serious pest were shown. The case was completed by very fine representations of the injury the insect inflicts on such a large number of our fruits. Citrus-injuring moths, butterflies, and the peculiar scale insects affecting the same family of trees were also shown.

Vegetables.

Other cases contained specimens of insects which may be seen in every vegetable garden in the State, and which are thus of both general interest and great economic importance. The various moths of cabbage, potato-damaging beetle, and the pea and bean weevils, and characteristic damage due to each were shown very strikingly.

Cereals.

The damages due to insects which affect the cereal crops and stored grain were also demonstrated.

The Banana Beetle Borer.

The ravages of the banana beetle borer have created a big problem facing the banana industry. It is when the beetle is in the grub stage that it does the damage. Boring through the bulb it destroys the power of the plant to store sufficient food to give the best development of the plants and to yield the best fruit. The attack may be so severe that no bunch at all is produced. In order to check the increase of the beetle, too much care cannot be devoted to keeping the plantation as free as possible from the old butts and stems in which the beetle breeds in considerable numbers. Trapping by means of pieces of banana corm or stem for "baits" will get rid of a large proportion of the pest when this is carried out thoroughly and systematically.

In a corner of the court four stages in the life cycle (egg, grub, pupa, and adult beetle) of this pest were shown. Portions of the banana plants demonstrating the damage caused by the grubs and the appearance of the infested parts were shown, and these exhibits gave some idea of what to look for when examining for beetle borer.

Infested corms, or stems, when cut open, show the circular holes more or less tightly packed with waste plant material left by the grubs, and which will generally be found when these tunnels are followed up. The grubs are legless, with a white body and head of reddish brown. When full grown they are a little more than half an inch long. Beetles may also be present. When mature they are black, a little less than half an inch in length, with a curved trunk in front. The investigations being made by Mr. John L. Froggatt, B.Sc., of the Entomological staff, into the life history, habits, &c., of this pest have yielded much information, and have given results on control measures, under laboratory conditions, that have indicated lines along which successful methods of control, not previously followed, may be obtained.

THE STOCK DISEASES EXPERIMENT STATION.

The exhibit of the Stock Diseases Experiment Station at Yeerongpilly was both interesting and instructive to the stock raiser and the dairy farmer. In order to demonstrate the efficiency of the treatment of tick-infested cattle with standard

arsenical solution, a particular case is cited from recent investigations conducted at Yeerongpilly:—

Two cows were each infested with 600,000 young ticks. One of these animals, thirteen days later, was sprayed with the dipping fluid, the result being that only one tick survived, and this tick did not entirely escape the effect of the arsenic, for it only laid a very small number of eggs, nine of which hatched, but all the young ticks died within a few days. From the untreated cow, 3,761 fully engorged ticks were removed.

Any stockowner may free his property from the tick pest by dipping his cattle every fourteen days in a standard arsenical solution. By so doing his cows will increase in value and give more milk, while the markets for his surplus stock will be unrestricted.

Tuberculosis.

A series of permanently mounted specimens demonstrating the many manifestations of this disease were displayed, including tubercular lesions found in the ox, pig, domestic cat, and other animals. Of special interest was a tubercular udder from a dairy cow, and the tail of a bullock showing tubercular lesions as a result of inoculation with contaminated Pleuro virus. Tuberculin (the diagnostic agent for this disease) prepared at the Laboratory, Yeerongpilly, was also featured, together with brief information dealing with preventive measures.

Contagious Abortion.

This disease is known to exist among dairy stock in some localities in Queensland, and may be readily diagnosed by means of the agglutination test. This test is carried out at the Laboratory. Cultures of the germ associated with this disease were shown growing artificially on Agar Agar in partial vacuum.

There was also a display of Laboratory products, including Blackleg vaccine, Pleuro virus, Tuberculin for diagnosing tubercular disease in animals, and special vaccine for the prevention and treatment of different infectious diseases of animals.

The staff at Yeerongpilly will be pleased to furnish full information on personal or written application pertaining to this exhibit and kindred subjects.

PURE SEEDS AND STOCK FOODS.

The exhibit of the Seeds and Stock Foods Investigation Branch comprised a small collection of agricultural and vegetable seeds, also ninety of the weed seeds commonly occurring in seeds and stock foods. Farmers would do well to make themselves acquainted with such poisonous seeds as *Datura stramonium* (Thorn Apple) and *Ricinus communis* (Castor Oil Beans), and the suspected poisonous *Stachys arvensis* (Stagger weed), *Lolium temulentum* (Darnel), as well as with the following:—*Brassica sinapistrum* (Charlock), *Lepidium ruderale* (waste-places Cress), *Melilotus parviflora* (Hexham Scent), *Raphanus raphanistrum* (Wild Radish), *Sisymbrium orientale* (Oriental Rocket), and *Tagetes glandulifera* (Stinking Rodger), all of which impart a bad flavour to butter.

Better Seeds, Better Crops.

Seeds constitute the most variable material that the farmer or merchant purchases, and the success or failure of a crop or even succeeding crops may be wholly determined by the condition of the seed sown. No one can afford to leave any doubtful point to chance, and it is but common prudence to ascertain the purity and germination of all seeds before sowing or offering them for sale. These matters can only be decided by a scientific examination of a large and truly representative sample drawn from the actual bulk in the sender's possession. No charge is made to farmers in respect of samples of any seeds purchased by them for their own sowing, provided full particulars as to quantity purchased and the seller's name and address are forwarded with the sample.

The best is the cheapest whatever the price, and quality should be the one and only consideration that determines a purchase.

PLATE 57.—THE CAMPAIGN AGAINST STOCK DISEASES AND PESTS.
Activities of the Queensland Government Stock Institute Illustrated, Departmental Court.

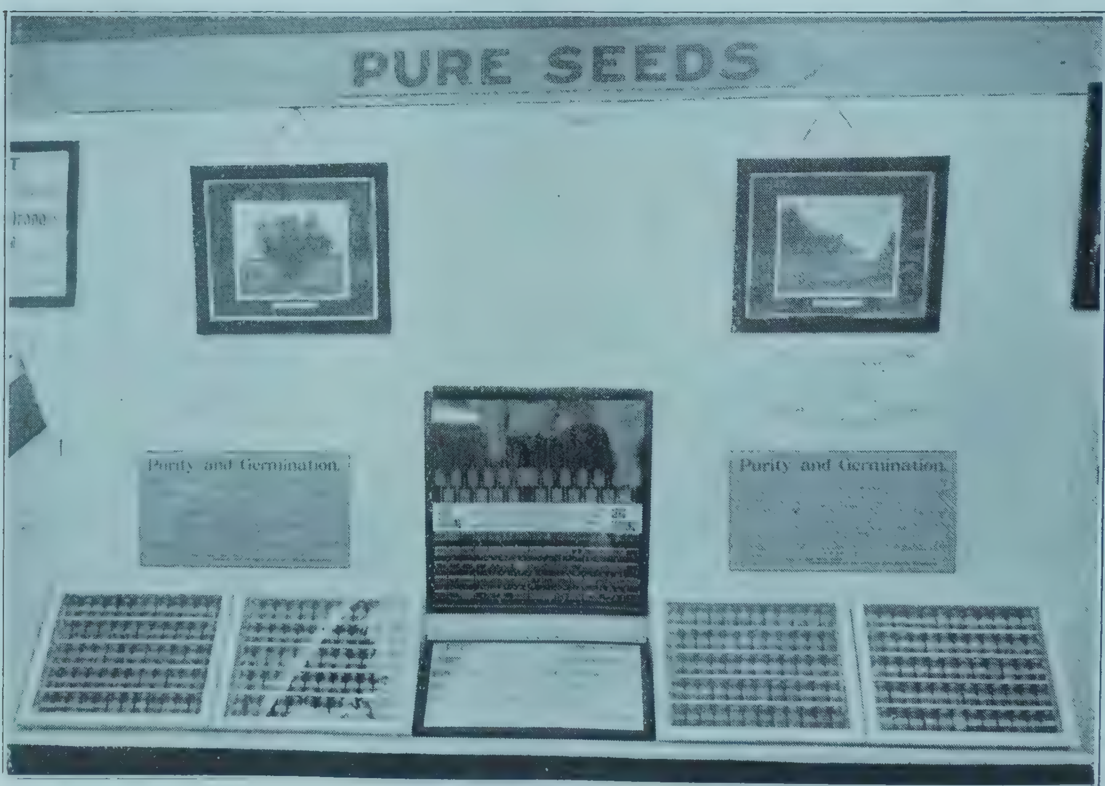


PLATE 58.—PROTECTING THE FARMERS' INTERESTS.
Activities of a little-known, but very effective section of the Department of Agriculture and Stock Illustrated, Departmental Court.

POLICE REMOUNTS.

An innovation in this year's ring programme was the introduction of an event for Police Remount horses, which were judged for style, action, and conformation. Thirteen members of the mounted force in the metropolitan area entered for the event. All the men were in dress uniform, and they made a most impressive appearance as they paraded in front of the judge. The horses were well groomed, and the accoutrements were in perfect order to the last button; the judge, Mr. Gidney, had no easy task in picking the three placed horses. They were all in the pink of condition, and, as the judge said afterwards, they looked quite good enough to compete in open hack company at any show. The horses were bred at the Government Remount Station at Rewa, near Springsure, and the manner in which they were shown and handled was certainly a credit to the Queensland Police Department. Mr. Gidney awarded the blue ribbon and first prize of £5 to Benedict, a very handsome brown

PLATE 59.—THE UNDER SECRETARY FOR AGRICULTURE AND STOCK, MR. ERNEST G. E. SCRIVEN (CENTRAL FIGURE) AND FRIENDS.

gelding by Lord Elderslie. The red ribbon and second prize of £3 went to Anchor, a bay gelding by Bonny Boy. The third prize of £2 was awarded to Merrut, a brown gelding by Libertine.

In commenting on the horses shown in this event, Mr. Gidney said it would be difficult to find in any part of Australia a group of horses of more equal quality. The first and second were good enough to win in any open company in any part of Australasia. All the horses were bred true to type, and it was a surprise to him to know that any Department could breed them so successfully. The winner was a rich brown, showing any amount of breeding and quality. The second also showed great quality, but was not so well educated as the first. In points, the third was not far behind, but youth favoured the first and second. The judge said he was more than pleased with the display, which, in his opinion, added considerably to the general excellence of the ring exhibits in the hack classes

The winner was ridden by Constable D. A. Prince, the second by Constable D. Doyle, and the third by Constable M. P. Hogan.

YOUNG JUDGES.

KEEN COMPETITION.

A most interesting feature of the stock section on 8th August was the Young Judges' Competition. The young entrants carried out their work in the midst of a crowd of stockbreeders and other interested persons. Thirty candidates faced the judge (Mr. D. C. Pryce), and were asked to judge the Clydesdale stallions, the Hereford beef cattle, the Illawarra milking shorthorns, Ayrshires, the Fresians, and the Berkshire swine. In all these classes they demonstrated their ability quite satisfactorily. Fourteen entered for the judging of the Illawarra milking shorthorn cow, and thirteen of them carried out their work. After a very keen competition, Mr. Pryce gave his decision in favour of Mr. Arthur Middleton (Wyreema), whose father is well known everywhere for his Illawarra cattle. The young winner was only five points behind the judge in this class. Mr. George Middleton, the winner's brother, was only a point behind him, and the third prize went to Mr. J. S. Anderson, of Southbrook.

In the Ayrshire cow competition, out of seven competitors, Mr. J. S. Handley (Murphy's Creek) was only one point behind the judge, and Messrs. O. W. Spresser (Brassall) and J. A. Anderson (Southbrook) both filled the same totals.

Mr. Arthur J Brown (Toogoolawah) gained first position in the judging of the Friesians, with Mr. E. Cochrane a close second.

The judge expressed great pleasure at the results of the competition as a whole, and commented especially on the closeness of the various candidates' points to his own. Details:—

Dairy Cattle, I.M.S.: A. Middleton, 1; G. Middleton, 2; J. S. Anderson, 3.

Ayrshires: J. S. Handley, 1; J. S. Anderson and O. W. Spresser (equal), 2.

Friesians: A. J. Brown, 1; E. Cochrane, 2.

Clydesdale Horses: C. R. Logan and O. W. Spresser equal.

Hereford Beef Cattle: O. W. Spresser.

Swine (Berkshires): C. T. Warburton, 1; H. F. Whitaker, 2.

PLATE 60.—THE SUN GOLD OF SUN LAND—A SAMPLE OF QUEENSLAND'S CITRUS PACK, DEPARTMENTAL COURT.

THE AWARDS.

DISTRICT EXHIBITS.

In the primary products and manufactures, in A grade, West Moreton again had a meritorious win with an aggregate grand total of 1,161½ points, as against Wide Bay and Burnett's grand total of 1,054 points. It is noteworthy that West Moreton's grand total in 1922 was 1,213 points, so that the exhibit has gone back as regards the aggregate this year. On the other hand, Wide Bay and Burnett's aggregate in 1922 was 816, while this year they have secured a grand total of 1,054, a very big improvement. In comparing the tabulated points it will be noticed that West Moreton led in the following sections:—Dairy produce, foods, grain, manufactures and trades, wines, &c., tobacco, hay, chaff, &c., wool, &c., enlarged photos, &c., and effective arrangement; while Wide Bay and Burnett had the best exhibits in fruit, vegetables, &c., minerals and building materials, and tropical products. Wide Bay and Burnett secured possible points for honey and by-products, rum, spirits and by-products, while West Moreton gained possible points for tobacco and enlarged photos, &c. The detailed points are as follows:—

PRIMARY PRODUCTS AND MANUFACTURES.

PRIZE MONEY UP TO £600.—CHAIRMAN'S TROPHY.

In addition to the prize money, a handsome trophy, value £15, was presented by Mr. Ernest Baynes, Chairman of Council, to the district scoring the highest points.

CHELMSFORD SHIELD.

—	Possible Points.	West Moreton.	Wide Bay and Burnett.
(1) DAIRY PRODUCE—			
Butter, 1 box, 56 lb.	90	83	87
Milk, condensed, concentrated, or dried, and by-products	40	38	10
Cheese, not less than 1 cwt.	60	50	55
Eggs, suitable for domestic use, 1 doz. of each variety	20	20	13
	210	186	165
(2) FOODS—			
Hams and bacon	50	44	43
Boiled and smoked beef and mutton	20	9	10
Small goods and sausages, if smoked or preserved ..	10	9	7
Fish, smoked, preserved, and canned	10	4	8
Canned meats	25	20	0
Lard, tallow, and animal oils	20	13	16
All butchers' by-products, not included in any other part of scale of points	10	9	8
Honey and its by-products	20	14	20
Confectionery, factory-made	10	6	4
Bread, biscuits, scones, and cakes, factory-made ..	10	7	3
	185	135	119

CHELMSFORD SHIELD—*continued.*

—	Possible Points.	West Moreton.	Wide Bay and Burnett.
(3) FRUITS, VEGETABLES, AND ROOTS—FRESH AND PRESERVED—			
Fresh fruits, all kinds	60	42	51
Preserved fruit, jams, &c.	30	28	20
Dried fruits	20	12	15
Fresh vegetables, all kinds, including table pumpkins, but excluding potatoes	25	22	20
Preserved and dried vegetables, pickles, sauces, &c.	10	6	9
Potatoes, English and sweet	40	34	35
Roots, all kinds, and their products, arrowroot, cassava, meal, &c., samples not less than 1 lb.	14	10	4
Cocoanuts, peanuts, and other nuts	6	3	5
	205	157	159
(4) GRAIN, &c.—			
Wheat	50	38	16
Flour, bran, pollard, macaroni, and meals prepared therefrom	10	1	9
Maize	50	42	26
Maizena, meals, starch, glucose, and cornflours ..	10	2	2
Oats, rye, rice, barley, malt, pearl barley, and their meals	30	20	22
	150	103	75
(5) MANUFACTURERS AND TRADES—			
All woodwork	30	24	27
All metal and ironwork	30	24	26
Leather and all leather-work and tanning	20	15½	14
Manufactured woollen and cotton fibre	30	25	..
All tinwork	10	8	8
Artificial manures	10	9	4
Brooms and brushes	10	6	3
Manufactures not otherwise enumerated	15	14	12
	155	125½	94
(6) MINERALS AND BUILDING MATERIALS—			
Gold, silver, copper, and precious stones	25	12	14
Coal, iron, other minerals, and salt	30	17	24
Stone, bricks, cement, marble, terracotta	20	16	14
Woods—Dressed, undressed, and polished, one face to be dressed and half of it polished, back to be rough, samples of wood to measure not less than 12 x 6 x 1 inch thick	25	21	20
	100	66	72

CHELMSFORD SHIELD—*continued.*

—	Possible Points.	West Moreton.	Wide Bay and Burnett.
(7) TROPICAL PRODUCTS—			
Sugarcane	60	25	50
Sugar (raw and refined)	20	2	18
Rum, spirits, and by-products	10	3	10
Coffee (raw and manufactured), tea, and spices ..	10	3	8
Cotton (raw) and by-products	30	20	18
Rubber	10	..	..
Oils (vegetable)	10	8	0
	150	61	104
(8) WINES, &c.—			
Wines	15	15	6
Aerated and mineral spa water, vinegar, and cordials	10	8	9
	25	23	15
(9) TOBACCO—			
Tobacco, cigar and pipe, in leaf	20	20	..
(10) HAY, CHAFF, &c.—			
Oaten, wheaten, lucerne, and other hay	30	24	18
Grasses and their seeds	10	8	6
Oaten, wheaten, lucerne, and other chaffs	50	42	30
Ensilage and other prepared cattle fodder	20	16	10
Sorghums and millets, in stalk	10	6	6
Commercial fibres (raw and manufactured)	10	7	6
Pumpkins and other green fodder	10	9	4
Broom millet, ready for manufacture	10	4	9
Farm seeds, including canary seed	13	7	10
	163	123	99
(11) WOOL, &c.—			
Scoured wool	40	34	36
Greasy wool	60	56	48
Mohair	10	7	8
	110	97	92
(12) ENLARGED PHOTOGRAPHS—			
A maximum of 5 points will be awarded for enlarged photographs of district scenery and local raised live stock	5	5	3
(13) EFFECTIVE ARRANGEMENT—			
Comprehensiveness of view	30	27	20
Arrangement of sectional stands	20	18	14
Effective ticketing	10	7	9
General finish	20	18	14
	80	70	57
Grand Total	1,558	1,161½	1,054

PRIMARY PRODUCTS.

As there was only one entry in this section—Kingaroy—the only comparison that can be made is with that district's last year's figures. This year the exhibit was awarded a grand total of 782 points, while in 1922 the grand aggregate was 767. According to the judges, the exhibit this year compared with last year as follows, the figures being (the latter in parentheses):—Dairy produce, 151 (148); foods, 70 (61); fruit, vegetables, &c., 95 (94); grain, &c., 97 (94); woods, 32 (32); hides, &c., 9 (4); tropical products, 26 (33); minerals, 26 (24); tobacco, 12 (5); hay, chaff, &c., 99 (101); wool, &c., 86 (97); photos, &c., 2 (2); ladies' work, 27 (36); effective arrangements, 51 (36); grand totals, 782 (767). Details:—

PRIMARY PRODUCTS ONLY.

PRIZE MONEY, UP TO £400.

—	Possible Points.	Kingaroy.
(1) DAIRY PRODUCE—		
Butter, 1 box, 56 lb.	90	88
Cheese, not less than 1 cwt.	60	55
Eggs, suitable for domestic use, 1 doz. of each variety	20	8
	170	151
(2) FOODS—		
Hams, bacon (rolled and smoked), beef, and mutton	50	35
Fish—smoked	10	0
Lard, tallow, and animal oils	15	9
Honey and its by-products	25	10
Confectionery (home-made)	10	8
Biscuits, bread, cakes, and scones (home-made)	10	8
	120	70
(3) FRUITS, VEGETABLES, AND ROOTS—FRESH AND PRESERVED—		
Fresh fruits—all kinds	60	20
Preserved fruit and jams, &c., prepared by farmer	20	16
Dried fruit, prepared by farmer	5	5
Fresh vegetables, all kinds, including table pumpkin, but excluding potatoes	25	7
Preserved and dried vegetables, pickles, sauces, &c.	10	7
Potatoes, English and sweet	40	20
Roots, all kinds, and their product, arrowroot, cassava, meal, &c., samples not less than 1 lb.	10	4
Cocoanuts, peanuts, and other nuts	10	7
Vegetable seeds	10	9
	190	95
(4) GRAIN, &c.—		
Wheat	50	30
Flour, bran, pollard, macaroni, and meals prepared therefrom	10	2
Maize	50	40
Maizena, meals, starch, glucose, and cornflour	10	4
Oats, rye, rice, barley, malt, pearl barley, and their meals	30	21
	150	97
(5) WOODS—		
Woods—Dressed, undressed, and polished, one face to be dressed and half of it polished, back to be rough. Samples to measure not less than 12 x 6 x 1 inch thick	25	20
Wattle bark	15	12
	40	32

PRIMARY PRODUCTS ONLY—*continued.*

—	Possible Points.	Kingaroy.
(6) HIDES (1) AND HOME PRESERVED SKINS, FOR DOMESTIC USE— Must be free from offensive smell	15	9
(7) TROPICAL PRODUCTS—		
Sugar cane	60	3
Coffee, tea, spices	10	3
Cotton (raw) and by-products	30	20
	100	26
(8) MINERALS—		
Gold, silver, copper, and precious stones	25	10
Coal, iron, and other minerals, and salt	30	15
	55	25
(9) TOBACCO—		
Tobacco (cigar and pipe) in leaf	20	12
(10) HAY, CHAFF, &c.—		
Lucerne, oaten, wheaten, and other hay	30	20
Grasses and their seeds	7	6
Oaten, wheaten, lucerne, and other chaffs	50	25
Ensilage and other prepared cattle fodder	20	8
Sorghums and millets	10	8
Commercial fibres	10	3
Pumpkins and other green fodder	10	6
Hemp and flax	10	4
Broom millet, ready for manufacture	10	8
Farm seeds, including canary seed	13	11
	170	99
(11) WOOL, &c.—		
Scoured wool	40	34
Greasy wool	60	45
Mohair	10	7
	110	86
(12) ENLARGED PHOTOGRAPHS— A maximum of 5 points will be awarded for enlarged photographs of district scenery and local bred live stock	5	2
(13) LADIES' WORK—		
Needlework, knitting	25	12
School needlework	5	4
Fine arts	5	4
School work, maps, writing, &c., for pupils of schools in the district	10	7
	45	27
(14) EFFECTIVE ARRANGEMENT—		
Effective ticketing	10	4
Comprehensiveness of view	30	23
Arrangement of sectional stands	20	14
General finish	20	10
	80	51
Total	1,270	782

ONE-FARM COMPETITION.

The awards in the one-farm exhibits gave Mr. K. Haag a grand total of 438½ points, compared to his opponent's (Mr. A. Lofgren's) 351½ points, and thus for the second year in succession Mr. Haag is the winner of this interesting competition. Both exhibits were particularly creditable. Details:—

COLLECTION OF FARM PRODUCE, FOODS FOR CONSUMPTION, Etc.

——	Possible Points.	K. Haag.	A. Lofgren.
(1) Dairy Produce—			
Butter, 6 lb.	25	23	22
Cheese, 1 large or 2 small, home-made	20	19	7
Eggs, suitable for domestic use, 1 doz. each variety	5	3	4
	50	45	33
(2) Foods—			
Hams (15 lb.), bacon (15 lb.), home-cured	20	15	13
Corned, smoked, and spiced beef and mutton (10 lb.)	10	7	8
Honey, 12 lb.	10	8	10
Beeswax, 6 lb.	5	4	5
Bread (2 loaves), scones (1 doz.)	5	3½	2½
Confectionery and sweets, 3 lb.	5	4	3
Cakes and biscuits	5	4	2
Lard, tallow, oils	5	4	3
	65	49½	46½
(3) Fruits, Vegetables, and Roots—Fresh and Preserved—			
Fresh fruits, all kinds	25	9	15
Dried fruits	10	10	4
Preserved fruits and jams	15	15	8
Fresh vegetables	15	10	12
Pickles, sauces, &c.	15	15	12
Potatoes, not less than 28 lb. (or a collection) and roots	25	20	18
Table pumpkin, squashes, and marrows, 56 lb.	10	8	6
Cocoanuts and nuts	3	2	1
Vegetable and garden seeds	5	4	3
Arrowroot, 10 lb.	5	3	3
Sugar, beet, 3 lb.	5	2	3
Cassava, 3 lb.	5	..	..
Ginger, 3 lb.	5	..	..
	143	98	80
(4) Grain, &c.—			
Wheat	25	20	6
Maize	20	17	11
Barley, oats, rye, and rice	20	15	12
	65	52	29
(5) Tropical Products—			
Sugar-cane, 24 stalks or 1 stool	30	12	24
Cotton in seed, 10 lb., long staple	10	6	8
Coffee, 10 lb.	5	0	5
	45	18	37

ONE-FARM COMPETITION—*continued.*

—	Possible Points.	K. Haag.	A. Lofgren.
(6) TOBACCO—			
Tobacco, leaf, dried, 5 lb.	10	..	..
(7) HAY AND CHAFF, &c.—			
Hay, oaten, wheaten, lucerne, and other varieties ..	20	15	8
Grasses and their seeds, including canary	10	9	7
Chaff, oaten, wheaten, lucerne, and other varieties ..	20	15	12
Ensilage, any form	15	6	6
Cattle fodder (pumpkins and green fodder)	15	14	14
Sorghums and millets	10	9	6
Hemp, 5 lb.	5	2	0
Flax, 5 lb.	5	2	0
Cow pea seed, 7 lb.	7	5	3
Broom millet, 10 lb.	10	9	..
	117	86	56
(8) WOOL—			
Greasy, 5 fleeces	20	15	14
Mohair	5	4	0
	25	19	14
(9) DRINKS, &c.—			
Temperance drinks, 6 bottles	10	8	6
(10) WOMEN'S AND CHILDREN'S WORK—			
Needlework, knitting	10	7	7
Fine arts	5	2	2
Fancy work	15	10	10
School work, maps, writing, &c.	5	..	..
School needlework	5	..	..
	40	19	19
(11) MISCELLANEOUS ARTICLES OF COMMERCIAL VALUE	5	4	2
(12) PLANTS AND FLOWERS IN POTS	5	4	1
(13) TIME AND LABOUR-SAVING USEFUL ARTICLES MADE ON THE FARM	10	6	2
(14) EFFECTIVE ARRANGEMENT OF EXHIBIT—			
Comprehensiveness of view	10	8	8
Arrangement of stands	5	5	4
Effective ticketing	10	9	7
General finish	10	8	7
	35	30	26
Total	625	438½	351½

FARM PRODUCE.

(Judges: Agricultural products, Messrs. H. Quodling, C. McKeon, C. Clydesdale (Department of Agriculture); cotton, Mr. D. Jones.

Maize (shelled).—Large yellow: Hawkesbury Champion or Goldsbury King—W. F. Elliott 1, H. Dipple 2; Improved Yellow Dent, J. and F. Stenzel 1 and 2; Yellow Dent—C. W. Lubach 1, E. Pickering 2.

Small yellow: Early Leaming, J. and F. Stenzel; Reid's Funks or James's Yellow Dent, J. and F. Stenzel.

So-called Ninety Days: Small Yellow Dent—W. Dearling; Small Yellow Flint, J. and F. Stenzel.

Other varieties: Large White—W. Neal, junr.; Red Hogan—J. and F. Stenzel; Red Butcher or other distinct red type not eligible in other red classes—J. and F. Stenzel 1 and 2; Small Early Red—C. S. Huxley 1, T. Fisher 2, J. and F. Stenzel 3; sweet corn, other varieties, 10 lb.—No first, H. Dipple 2; popcorn, any variety, 10 lb.—H. Dipple 1, J. Donges 2. Champion prize for best exhibit shown—W. Elliott. Association's certificate—C. W. Lubach.

Maize ears.—Large yellow: T. Fisher. Large white: W. Neal, junr. Any other white variety: H. Dipple. Popcorn: J. Donges.

Wheat.—Medium strong flour, one bag: O. L. Heutschel 1, C. S. Huxley 2. Grand champion prize, best exhibit of wheat: O. L. Hentschel 1, R. Wiedon 2, W. Dearling, 3.

Barley.—Malting barley, 1 bushel, Chevalier or Battledore type: No first, H. Obst 2. Sea of Azov type: H. Obst 1 and 2. Cape barley: J. D. Berney. Skinless barley: C. S. Huxley 1, J. Campbell 2.

Oats.—Algerian or Sunrise: J. D. Berney.

Hay.—Lucerne hay, best dry, green, coloured: J. H. Boatfield. Oaten hay: C. S. Huxley. Straw, any kind: C. S. Huxley. Oaten hay, Algerian, suitable for chaffing: H. W. Berlin 1, T. Fisher 2. Oaten hay, Tartarian, for chaffing purposes: H. W. Berlin 1 and 2. Wheaten hay, for chaffing: H. W. Berlin 1, C. S. Huxley 2.

Chaff.—Lucerne chaff, cut from dry, green, coloured hay: J. E. Stanton 1, J. H. Boatfield 2. Cut from prime sweated hay: J. Campbell 1, W. Dearling 2. Oaten chaff, screened and bright, cut from prime hay: W. H. Berlin 1, C. S. Huxley 2. Wheaten chaff, screened, bright, cut from prime hay: H. W. Berlin 1, J. Donges 2. Mixed chaff, oaten and lucerne: H. W. Berlin 1, C. S. Huxley 2. Wheaten and lucerne: H. W. Berlin 1, C. S. Huxley 2. Panicum and lucerne: H. W. Berlin 1, J. Campbell 2. Any other variety: J. Campbell. Millet or panicum chaff, any kind, cut from prime hay: J. Campbell 1, K. Haag 2. Grass hay chaff, cut from artificial and native grasses: H. W. Berlin. Wheaten straw chaff: C. S. Huxley 1, W. Dearling 2. Straw chaff, any other kind: J. Campbell 1, W. Dearling 2.

Sorghums and millets.—Saccaline: H. W. Berlin. Painters' Friend: H. W. Berlin 1, H. Dipple 2. Amber cane. H. Dipple. Soudan grass: C. S. Huxley. Panicum and fodder millet, Liberty millet: C. S. Huxley 1, H. W. Berlin, 2. Japanese millet: H. W. Berlin 1, C. S. Huxley 2. White panicum: H. W. Berlin.

Pasture grass seeds.—Prairie grass: C. S. Huxley 1, H. W. Berlin 2. Lucerne seed: C. S. Huxley.

Flax and hemp.—Dressed flax: W. Dearling.

Beans and peas.—Cow peas, black: W. Dearling. Clay-coloured: C. S. Huxley. Black-eyed Susan: C. S. Huxley.

Miscellaneous.—Giant Russian sunflower: J. Donges. Canary seed of commerce: K. Haag 1 and 2. Linseed: W. Dearling.

Sugar-cane.—Collection of good milling varieties: B. French and Son. Five sticks, D.1135: B. French and Son. Five sticks, 1900 seedling: B. French and Son.

Potatoes.—Blue varieties: Guyra Blue, Coronation, or Commonwealth—L. Ebert 1, C. W. Lubach 2. Manhattan—L. Ebert. Brownell varieties, any variety other than Satisfaction—A. Loweke 1, T. Fisher 2. Satisfaction—A. Loweke 1, L. Ebert 2. White varieties: Carmen—A. Loweke 1, J. F. Dietz 2. Manistee—C. Seiler 1. Scottish Triumph—A. Loweke. Up-to-date—C. W. Lubach.

Champion blue potato exhibit: L. Ebert. Champion Brownell: A. Loweke. Champion white: A. Loweke.

Pumpkins.—Crown: J. Campbell 1 and 2. Cattle pumpkins, judged by weight: C. W. Lubach. Bugle: J. and F. Stenzel. Piemelons: J. Steeleither. Mangold wurzel, long, red: H. W. Berlin. Swedes, purple top: J. Steeleither.

EXPORT BUTTER.

THIRTY DAYS' STORAGE.

One box butter (salted), most suitable for export, to be stored thirty clear days:—

—	Flavour.	Texture.	Colour.	Salting.	Finish.	Total.
Queensland Farmers' Co-operative Co., Ltd., Boonah	60	20	7	4	4	95
Nanango Co-operative Dairy Co., Ltd. ..	60½	19½	7	4	3½	94½
Maryborough Co-operative Dairy Co., Ltd., Kingaroy	59½	20	7	4	3½	94
Queensland Farmers' Co-operative Co., Ltd., Grantham	58	20	7	4	4	93
Queensland Farmers' Co-operative Co., Ltd., Booval	58	19½	7	4	4	92½
Queensland Farmers' Co-operative Co., Ltd., Laidley	58½	19½	7	3½	4	92½
Esk Co-operative Dairy Co., Ltd. ..	58	19½	6½	4	4	92
Wide Bay Co-operative Dairy Co., Ltd., Gympie	58	19½	7	4	3½	92
Stanley River Co-operative Co., Ltd. ..	57	20	7	4	3½	91½
Warwick Butter and Dairy Co., Ltd., Mill Hill	57	19½	7	4	4	91½
Caboolture Co-operative Co., Ltd., Pomona	57	19½	6½	4	4	91
Logan and Albert Co-operative Dairy Co., Ltd.	58	19½	6	4	3½	91
Maryborough Co-operative Dairy Co., Ltd., Biggenden	58	19	6	4	4	91
South Burnett Co-operative Dairy Co., Ltd.	58	19	6½	4	3½	91
Warwick Butter and Dairy Co., Ltd., Allora	56	19½	7	4	4	90½
Maryborough Co-operative Dairy Co., Ltd., Mundubbera	57	19½	6½	4	3½	90½
Caboolture Co-operative Co., Ltd., Caboolture	56	19½	6½	4	4	90
Maleny Co-operative Dairy Co., Ltd. ..	57	19½	6	4	3½	90
Caboolture Co-operative Co., Ltd., Eumundi	56	19½	6	4	4	89½
Terror's Creek and Samsonvale Co-operative Society, Ltd.	55	19	6½	4	3½	88
Gayndah Co-operative Dairy Co., Ltd. ..	53	19½	7	4	3½	87

EIGHT WEEKS' STORAGE.

One box (unsalted), most suitable for export, to be stored eight weeks:—

—	Flavour.	Texture.	Colour.	Packing and Finish.	In place of Salt	Total
Queensland Farmers' Co-operative Co., Ltd., Grantham	60	20	7	4	4	95
Wide Bay Co-operative Dairy Co., Ltd., Gympie	59½	19½	7	4	4	94
Queensland Farmers' Co-operative Co., Ltd., Laidley	59	19½	7	4	4	93½
Logan and Albert Co-operative Dairy Co., Ltd.	58½	19½	7	4	4	93
Esk Co-operative Dairy Co., Ltd... ..	58	19½	7	4	4	92½
Caboolture Co-operative Co., Ltd., Caboolture	57	20	7	4	4	92
Maryborough Co-operative Dairy Co., Ltd., Mundubbera	58	19½	7	3½	4	92
Queensland Farmers' Co-operative Co., Ltd., Boonah	57½	19½	7	4	4	92

EXPORT BUTTER—*continued.*

ONE BOX EIGHT WEEKS' STORAGE (UNSALTED)—*continued.*

—	Flavour.	Texture.	Colour	Packing and Finish.	In place of Salt.	Total.
Queensland Farmers' Co-operative Co., Ltd., Booval	57½	19½	7	4	4	92
Terror's Creek and Samsonvale Co-operative Society, Ltd.	58	19½	7	3½	4	92
Warwick Butter and Dairy Co., Ltd., Millhill	57	19½	7	4	4	91½
Nanango Co-operative Dairy Co., Ltd. ..	58½	19	6½	3½	4	91½
Maryborough Co-operative Dairy Co., Ltd., Biggenden	57	19½	7	4	4	91½
Maryborough Co-operative Dairy Co., Ltd., Kingaroy	57	19½	7	3½	4	91
Caboolture Co-operative Co., Ltd., Eumundi	56	19½	7	4	4	90½
Gayndah Co-operative Dairy Co., Ltd. ..	57	19½	6	4	4	90½
Warwick Butter and Dairy Co., Ltd., Allora	57	19	7	3½	4	90½
Caboolture Co-operative Co., Ltd., Pomona	57	19½	5½	4	4	90
Stanley River Co-operative Co., Ltd. ..	56	19½	7	3½	4	90
Maleny Co-operative Dairy Co., Ltd. ..	54	19	7	3	4	87

One box butter (salted), suitable for export, to be kept in cold stores for not less than eight weeks:—

—	Flavour.	Texture.	Colour.	Salting.	Packing and Finish.	Total.
Queensland Farmers' Co-operative Co., Ltd., Grantham	60	20	7	4	4	95
Queensland Farmers' Co-operative Co., Ltd., Boonah	59	20	7	4	4	94
Nanango Co-operative Dairy Co., Ltd. ..	59½	19½	6½	4	3½	92½
Queensland Farmers' Co-operative Co., Ltd., Laidley	58½	19½	7	4	4	92
Caboolture Co-operative Co., Ltd., Caboolture	57	19½	7	4	4	91½
Esk Co-operative Dairy Co., Ltd. ..	57½	19½	6½	4	4	91½
Logan and Albert Co-operative Dairy Co., Ltd.	57	19½	7	4	4	91½
Maryborough Co-operative Dairy Co., Ltd., Biggenden	57½	19½	7	4	3½	91½
Queensland Farmers' Co-operative Co., Ltd., Booval	58	19½	6½	3½	4	91½
Warwick Butter and Dairy Co., Ltd., Allora	57	19½	7	3½	4	91
Warwick Butter and Dairy Co., Ltd., Millhill	57	19½	7	3½	4	91
Maleny Co-operative Dairy Co., Ltd. ..	57	19½	6½	4	4	91
Wide Bay Co-operative Dairy Co., Ltd., Gympie	57	19½	7	3½	4	91
South Burnett Co-operative Dairy Co., Ltd.	57	19½	6½	4	3½	90½
Maryborough Co-operative Dairy Co., Ltd., Mundubbera	57	19½	6	3½	4	90
Stanley River Co-operative Dairy Co., Ltd.	56½	19½	7	3½	3½	90
Caboolture Co-operative Co., Ltd., Eumundi	55	19½	7	4	4	89½
Gayndah Co-operative Dairy Co., Ltd. ..	56	19½	6½	3½	4	89½
Terror's Creek and Samsonvale Co-operative Society, Ltd.	55	19	6½	4	3½	88
Maleny Co-operative Dairy Co., Ltd. ..	53	19	6½	4	3½	86

BUTTER AWARDS.

Box butter (salted), most suitable for consumers' trade in Britain. The butter to be manufactured from pasteurised cream and to be cold stored eight weeks:—

—	Flavour.	Texture.	Colour.	Salting.	Packing and Finish.	Total.
Queensland Farmers' Co-operative Co., Ltd., Boonah	60	20	7	4	4	95
Queensland Farmers' Co-operative Co., Ltd., Grantham	59½	20	7	4	4	94½
Queensland Farmers' Co-operative Co., Ltd., Laidley	58½	20	7	3½	4	93
Maryborough Co-operative Dairy Co., Ltd., Kingaroy	58	20	7	4	3½	92½
Queensland Farmers' Co-operative Co., Ltd., Booval	58	19½	7	4	4	92½
Esk Co-operative Dairy Co., Ltd. ..	57	19½	7	4	4	91½
Maryborough Co-operative Dairy Co., Ltd., Biggenden	57½	19½	6½	4	4	91½
Maryborough Co-operative Dairy Co., Ltd., Mundubbera	58	19½	6½	4	3½	91½
Nanango Co-operative Dairy Co., Ltd. ..	58	19½	6½	4	3½	91½
Caboolture Co-operative Co., Ltd., Caboolture	57	19½	6½	4	4	91
Caboolture Co-operative Co., Ltd., Pomona	57	19½	6½	4	4	91
Logan and Albert Co-operative Dairy Co., Ltd.	57	19½	6½	4	4	91
Warwick Butter and Dairy Co., Ltd., Allora	57	19	7	3½	4	90½
Warwick Butter and Dairy Co., Ltd., Millhill	57	19	7	3½	4	90½
Wide Bay Co-operative Dairy Co., Ltd., Gympie	55	19½	7	4	4	89½
Caboolture Co-operative Co., Ltd., Eumundi	55	19½	6½	4	4	89
Terror's Creek and Samsonvale Co-operative Society, Ltd.	55	19	6	4	3½	88½
Gayndah Co-operative Dairy Co., Ltd. ..	55	19½	6	4	3½	88
Maleny Co-operative Dairy Co., Ltd. ..	54	19	6	4	3½	86½

FRESH BUTTER.

ONE BOX FRESH FACTORY-MADE BUTTER FOR LOCAL CONSUMPTION.

—	Flavour.	Texture.	Colour.	Salting.	Packing and Finish.	Total.
Maryborough Co-operative Dairy Co., Kingaroy	60	20	7	4	4	95
Queensland Farmers' Co-operative Co., Ltd., Booval	59½	20	7	4	4	94½
Nanango Co-operative Dairy Co., Ltd. ..	59½	19½	7	4	3½	93½
Wide Bay Co-operative Dairy Co., Ltd., Gympie	58	20	7	4	4	93
Esk Co-operative Dairy Co., Ltd. ..	58	20	7	4	4	93
Queensland Farmers' Co-operative Dairy Co., Ltd., Boonah	58	20	7	4	4	93

FRESH BUTTER—*continued.*

ONE BOX FRESH FACTORY-MADE BUTTER FOR LOCAL CONSUMPTION—*continued.*

—	Flavour.	Texture.	Colour.	Salting.	Packing and Finish.	Total.
Queensland Farmers' Co-operative Co., Ltd., Grantham	58	20	7	4	4	93
Queensland Farmers' Co-operative Co., Ltd., Laidley	58	20	7	4	4	93
Caboolture Co-operative Co., Ltd., Caboolture	58	19½	7	4	4	92½
Caboolture Co-operative Co., Ltd., Pomona	58	19½	7	4	4	92½
Maleny Co-operative Dairy Co., Ltd. ..	58½	19½	7	4	3½	92½
Logan and Albert Co-operative Dairy Co., Ltd.	57	19½	7	4	3½	91
South Burnett Co-operative Dairy Co., Ltd.	57	19½	6½	6½	4	91
Caboolture Co-operative Co., Ltd., Eumundi	56	19½	7	4	4	90½
Gayndah Co-operative Dairy Co., Ltd. ..	57	19½	6½	4	3½	90½
Maryborough Co-operative Dairy Co., Ltd., Biggenden	57	19	6	4	4	90
Warwick Butter and Dairy Co., Ltd., Allora	56	19½	7	4	3½	90
Terror's Creek and Samsonvale Co-operative Society, Ltd.	56	19½	7	4	3½	90
Warwick Butter and Dairy Co., Ltd., Millhill	55	19½	7	4	4	89½
Stanley River Co-operative Co., Ltd. ..	55	19½	7	4	3½	89
Maryborough Co-operative Dairy Co., Ltd., Mundubbera	56	19	6	4	3½	88½

AGGREGATE NUMBER OF POINTS SECURED FOR ALL CLASSES OF BUTTER.

—	Thirty Days' Storage (Salted).	Eight Weeks' Storage (Unsalted).	Eight Weeks' Storage (Salted).	Eight Weeks' (Salted), Pasteurised.	One Box Fresh Butter.	Grand Total.
Queensland Farmers' Co-operative Dairy Co., Ltd., Grantham	93	95	95	93½	93	469½
Queensland Farmers' Co-operative Dairy Co., Ltd., Booval	92½	92	91½	92½	94½	463
Queensland Farmers' Co-operative Dairy Co., Ltd., Laidley	92½	93½	92	93	93	464
Maryborough Co-operative Co., Ltd., Kingaroy	94	91	91½	92½	95	464
Nanango Co-operative Dairy Co.	94½	91½	92½	91½	93½	463½
Queensland Farmers' Co-operative Dairy Co., Ltd., Boonah	95	92	94	95	93	469

CHEESE.

Two export cheeses, 70-80 lb. (to be not more than three weeks old prior to storing), white, suitable for English market:—

—	Flavour.	Texture.	Colour.	Finish.	Total.
Possible points	50	25	15	10	100
(1) Pittsworth Dairy Co., Ltd., No. 2 Factory ..	45	25	15	10	95
(2) Pittsworth Dairy Co., Ltd., No. 1 Factory ..	43½	25	15	10	93½
(3) Gayndah Dairy Co., Ltd., Byrnestown ..	44½	24	15	8½	92
Woodleigh Cheese Factory	41½	24½	14½	9½	90

Two export cheeses, 70-80 lb. (to be not more than three weeks old prior to storing), coloured, suitable for English market:—

—	Flavour.	Texture.	Colour.	Finish.	Total.
(1) Woodleigh Cheese Factory	44½	24½	14½	9½	93
(2) Mount Tyson Farmers' Co-operative Dairy Co., Ltd...	44	25	15	8½	92½
(3) Pittsworth Dairy Co., Ltd., No. 1 Factory ..	43	24½	14½	10	92
Gayndah Co-operative Dairy Co., Ltd., Byrnestown	43	25	14	8½	90½

COTTON GROWING.

—	Desirability of Type, 20.	Fruitfulness, 20.	Uniformity of Length of Fibre, 15.	Uniformity of Strength of Fibre, 15.	Storm-proof Qualities, 10.	Degree of Opening of the Bolls, 10.	Earliness, 10.	Total, 100.
TWO PLANTS—								
F. Coglan	18	16	12	12	6	8	5	77

—	Weight of Bolls, 20.	Uniformity of Length of Fibre, 20.	Uniformity of Strength of Fibre, 20	Drag of Lint of Bolls, 20.	Drag of Lint, 10.	Character of Lint, 10.	Total, 100.
MATURED OPEN BOLLS OF SEED COTTON—							
E. G. Clarke	20	16	18	15	8	8	85
F. Coglan	18	15	18	12	8	8	79

—	Size of Lock, 20.	Uniformity of Length of Fibre, 20.	Uniformity of Strength of Fibre, 20.	Drag of Lint, 15.	Character of Lint, 15.	Cleanliness, 10.	Total, 100.
SEED COTTON, 10 LB.—							
A. S. Bailey	13	16	15	12	15	10	81
A. S. Bailey	13	18	18	10	15	10	84
J. Logan	14	16	15	12	15	10	82

BEEF CATTLE.

Herefords (judge, R. Reynolds).—Bull, 4 years and over: J. Sparkes's Mangel Banner Prince 1, J. T. Turnor's Holmwood Baron 2. Bull, 3 and under 4 years: Archer Bros.' Ltd. Fanfare II. 1, J. Sparkes's Lyndley Monarch I. 2, E. C. McConnel's Cressbrook Merry Boy 3. Bull, 2 and under 3 years: Wilson and McDowall's Eton Victory 1, E. G. McConnel's Cressbrook Premier 2, J. Sparkes's Admiration 3. Bull, 18 months and under 2 years: C. H. Tindal's Ramornie Fearless 1, Tindall and Son's Gunyan Lad 2, J. Sparkes's Lyndley Ringer 3, Tindall and Son's Gunyan Grandee highly commended. Bull, 12 and under 18 months: Archer Bros. Ltd. Dreamer V. 1, J. Sparkes's Lyndley Hilsman 2, J. Sparkes's Lyndley Statesman 3. Bull calf, 6 months and under 12: Archer Bros. Ltd. Premier 1, J. Sparkes's Lyndley Ambassador 2, J. Sparkes's Lyndley Plum 3. Pair bulls, 12 months and under 3 years, special prize: Tindall and Son's Gunyan Grandee and Gunyan Lad. Group of three bulls, 12 months and under 3 years: J. Sparkes. Cow, 4 years and over: J. H. S. Barnes's Miss Bettie 2nd 1, J. Sparkes's Jessie Lyndley 2. Cow, 3 and under 4 years: J. Sparkes's Jessie Lyndley 15th. Cow or heifer, 2 and under 3 years: J. H. S. Barnes's Canning Chance 1, J. Sparkes's Lyndley Minerva 18th 2. Heifer, 18 months and under 2 years: J. Sparkes's Lyndley Baroness 1, J. H. S. Barnes's Flower Queen 2, J. H. S. Barnes's Last Night 3. Heifer, 12 and under 18 months: J. Sparkes's Madge Lyndley 2nd 1, Archer Bros. Ltd. Alto 9th 2. Heifer calf, 6 and under 12 months: J. Sparkes's Lyndley Beauty 2nd 1, E. C. McConnel's Cressbrook Saucy 4th 2. Pair of heifers, 12 months and under 2 years: J. Sparkes 1, J. H. S. Barnes 2. Group, three heifers, 12 months and under 3 years: J. H. S. Barnes 1, J. Sparkes 2. Breeders' group, two males and three females: J. Sparkes. Exhibitors' group, two males and three females: J. Sparkes. Sires' progeny stakes group: J. H. S. Barnes 1, J. Sparkes 2, Archer Bros. 3.

Champion Hereford Bull: Wilson and McDowall's Eaton Victory.

Reserve Champion Hereford Bull: J. Sparkes's Mansel Banner Prince.

Junior Champion Hereford Bull: Archer Bros. Ltd. Dreamer 5th.

Champion Hereford Cow: J. H. S. Barnes's Ness Beattie 2nd.

Reserve Champion Hereford Cow: J. H. S. Barnes's Canning Chance.

Shorthorns (judge, W. R. Scott).—Bull, 4 years and over: J. Burgess's Adeote Butterfly Beau 1, O. C. Slade's Aladdin 2. Bull, 3 years and under 4 years: Late C. E. McDougall's Estate's Lyndhurst Royal Peer 27th. Bull, 2 years and under 3 years: Late C. E. McDougall's Estate's Lyndhurst Royal Peer 35th 1, Whitney Pastoral Co.'s Coombing Duke of Widgiewa I. 2, Mrs. I. Whitney's Coombing Duke of Derrimut 19th 3. Bull, 18 months and under 2 years: J. Burgess's Lord Donnington 1, H. Pownall's Fairy Knight IV. 2, J. Burgess's Count Ringmaster 3. Bull, 12 and under 18 months: J. S. Shonemann's Kuyura Duke of Derrimut 14th 1, A. E. Slade's Warspite III. 2, A. E. Slade's Warspite V. 3. Bull calf, 6 months and under 12 months: Wilson and McDowall's Calliope Count Goldie 39th 1, Late C. E. McDougall's Estate's Lyndhurst Royal Peer 36th 2, Late C. E. McDougall's Estate's Lyndhurst Royal Peer 27th 3. Group of three bulls: J. Burgess 1, Cain Bros. 2. Cow, 4 years and over: Late C. E. McDougall's Estate's Lyndhurst Royal Rose 1, J. T. Scrymgeour's Boquhan Clara III. 2, late C. E. McDougall's Estate's Lyndhurst Princess Imperial II. 3. Cow, 3 and under 4 years: Late C. E. McDougall's Estate's Lyndhurst Duchess of Ettrick 1, late C. E. McDougall's Estate's Lyndhurst Duchess of York II. 2, J. Burgess's Fairy Peeress 3. Cow, with calf at foot: Late C. E. McDougall's Estate's Lyndhurst Royal Rose 1, J. T. Scrymgeour's Boquhan Clara III. 2, J. Burgess's Golden Bessie VII. 3. Cow and 2 or more of her progeny: Late C. E. McDougall's Estate's Lyndhurst Royal Rose 1, late C. E. McDougall's Estate's Lyndhurst Princess Imperial 2nd 2. Cow or heifer, 2 and under 3 years: Late C. E. McDougall's Estate's Lyndhurst Royal Rose 11th 1, Cain Bros.' Madowla's Bouvardine 2. Heifer, 18 months and under 2 years: Cain Bros., Madowla's Laurel 47th 1, J. Burgess's Oxford Countess 2, late C. E. McDougall's Estate's Lyndhurst Lady of Gurley 3. Heifer, 12 and under 18 months: Wilson and McDowall's Harlequin of Calliope 1, Wilson and McDowall's Secret Second of Calliope 2, Wilson

and McDowall's Cerasia of Calliope 3. Heifer calf, 6 and under 12 months: Late C. E. McDougall's Estate's Lyndhurst Lady of Beverley 20th 1, J. S. Thonemann's Kuyura Princess 4th 2, J. Burgess's Golden Butterfly 2nd 3, J. T. Scrymgeour's Netherby Red Rose highly commended. Three heifers, 12 months and under 3 years: Wilson and McDowall. Sire and 3 of his progeny, 12 months and over: J. Burgess's Adcot Butterfly Beau. Breeders' group: Late C. E. McDougall's Estate 1, J. Burgess 2. Exhibitors group: Late C. E. McDougall's Estate 1, J. Burgess 2. Sires' progeny stakes group: Wilson and McDowall 1, J. Burgess 2, late C. E. McDougall's Estate 3.

Champion Shorthorn Bull: J. Burgess's Adcote Butterfly Beau.

Reserve Champion Shornhorn Bull: O. C. Slade's Aladdin

Champion Shornhorn Cow: Late C. E. McDougall's Estate's Lyndhurst Duchess of Ettrick.

Reserve Champion Shorthorn Cow: Late C. E. McDougall's Estate's Lyndhurst Royal Rose.

Red Polled (judge, Mr. D. Gunn).—Bull, 3 years and over: E. J. McConnel's Royal Farmer. Bull, under 3 years: E. J. McConnel's Marshlands Royal Laurel 1, E. J. McConnel's Marshlands Royal Mac 2.

Champion Red Polled Bull: E. J. McConnel's Royal Farmer.

Reserve Champion Red Polled Bull: E. J. McConnel's Marshlands Royal Laurel.

Devons (judge, D. Gunn).—Bull, 3 years and over: R. A. Howell's Forester's Gold Dust. Bull, 2 and under 3 years: R. A. Howell's Field Marshal 47th. Bull, 1 and under 2 years: R. A. Howell's Just Perfection. Bull calf, 6 months and under 12: R. A. Howell's Field Marshal 80th 1, R. A. Howell's Field Marshal 81st 2. Heifer, 1 and under 2 years: R. A. Howell's Countessa 65th. Heifer calf, 6 and under 12 months: R. A. Howell's Countessa 78th.

Champion Devon Bull: R. A. Howell's Forester's Gold Dust.

Champion Devon Cow: R. A. Howell's Countessa 65th.

South Devons.—Bull: Nestlé—Anglo-Swiss Condensed Milk Co.'s (Australasia), Ltd., Hussar of Nestlés. Cow or heifer: Nestlé and Anglo-Swiss Condensed Milk Co.'s (Australasia), Ltd., Pansy 2nd.

Champion South Devon Cow: Nestlé and Anglo-Swiss Co.'s (Australasia), Ltd., Pansy 2nd.

Aberdeen Angus.—Bull, 3 years and over: D. W. McLeod's The Laird of Glen Aloon 1, G. C. Clarke's Tom Thumb 2. Bull, 2 and under 3 years: G. C. Clarke's Black Jupiter. Cow, 3 years and over: G. C. Clarke's Scotswoman. Heifer, 1 year and under 2: G. C. Clarke's Raffia 1, G. C. Clarke's Scottish Peeress 2.

Champion Aberdeen Angus Bull: D. W. McLeod's The Laird of Glen Aloon.

Champion Aberdeen Angus Cow: G. C. Clarke's Scotswoman.

Reserve Champion Aberdeen Angus Bull: G. C. Clarke's Black Jupiter.

Fat Cattle (judge, H. Schiver).—Pen of three bullocks, over 4, under 6 years: H. C. Taylor 1 and 2. Pen of three bullocks, under 4 years, special prize: I. J. and M. S. Moore. Pen of three bullocks most suitable for export, special prize: I. J. and M. S. Moore. Pen of three bullocks most suitable for freezing, special prize: I. J. and M. S. Moore. Pen of three Shorthorn bullocks: H. C. Taylor 1 and 2. Pen of three Hereford bullocks: I. J. and M. S. Moore 1, Ferling Bros. 2. Pen of three bullocks, special prize: I. J. and M. S. Moore. Pen of three crossbred bullocks: W. Drynan 1, T. Hawkins 2. Pen of three steers over 2 and under 3 years: I. J. and M. S. Moore 1, H. C. Taylor 2. Pen of three steers under 2 years: H. C. Taylor. Bullock, over 4 and not exceeding 6 years: I. J. and M. S. Moore 1, J. Armstrong 2. Bullock, under 4 years: I. J. and M. S. Moore 1 and 2. Steer, under 3 years: I. J. and M. S. Moore 1 and 2. Cow: W. Drynan. Heaviest bullock, special prize: H. C. Taylor. Bullocks for export: I. J. and M. S. Moore 1, H. C. Taylor 2 Bullock for local consumption: I. J. and M. S. Moore 1, H. C. Taylor 2.

Champion Bullock: I. J. and M. S. Moore.

DAIRY CATTLE.

Illawarra Milking Shorthorns (judges, Messrs. J. J. Hayter and E. J. Marks).—Cow, 5 years and over, in milk: W. Middleton, Mabel of Talgai, 1; A. Pickels, Jean 5th of Blacklands, 2; B. O'Connor, Dahlia 2nd of Hill View, 3; A. J. Caswell, Floss of Dnalwon, 4. Four and under 5 years: B. O'Connor, Rosebud 2nd of Greyleigh, 1; R. J. Morgan, Veresdale Ruby, 2; A. J. Caswell, Rosie 4th of Greyleigh, 3. Three and under 4 years: A. C. Payne, Heather 2nd of Hillcrest, 1; B. O'Connor, Skylark 2nd of Cosey Camp, 2; B. O'Connor, Lady James of Cosey Camp, 3. Heifer, 2 and under 3 years: F. O. Hayter, Fully 3rd of Spanfield, 1; P. Mears, Norah 3rd of Morden, 2; Macfarlane Bros., Remembrance 9th of Kilbirnie, 3. Cow, 4 years or over, in calf 6 months or dry: F. O. Hayter, Lady May of Willow Farm, 1; Nestlé and Anglo-Swiss Co., Gold 3rd of Nestlés, 2; J. H. Wade, Red Brier of Wadedale, 3. Three and under 4 years: J. Phillips, Nancy 2nd of Greyleigh, 1; Macfarlane Bros., Viola 26th of Darbalara, 2. Heifer, 2 years and under 3 years: W. M. Kruse, Brooklin Gentle of Greyleigh, 1; F. O. Hayter, Buttercup 4th of Hill View, 2; F. O. Hayter, Countess 3rd of Wingewah, 3. Heifer, 2 years and under 3: R. Mears, Bonnie 3rd of Morden, 1; C. Keys, Dolly of Sunnymeade, 2; A. C. Payne, Vision 2nd of Burradale, 3. Children's calf class: cow or heifer giving greatest yield of butter-fat in 24 hours: J. H. Wade, Red Brier of Wadedale, 1; R. J. Morgan, Hippy 2nd of Springdale, 2; J. Phillips, Chance of Woodlight, 3; R. J. Morgan, Veresdale Ruby, 4. Champion Illawarra Milking Shornhorn cow: B. O'Connor, Rosebud 2nd of Greyleigh. Reserve champion: W. Middleton's Mabel of Tailgai.

Bull, 3 and under 4 years: Nestlé and Anglo-Swiss Milk Co., Ltd., Royal George 2nd of Nestlés, 1; B. O'Connor, Charm's Duhalow of Oakvale, 2; H. C. Payne, Raleigh's Reflection of Glenthorn, 3. Two and under 3 years: Ahern Bros., Ly-Light of Berkeleydale, 1; Macfarlane Bros., Mowbray 2nd of Kilbirnie, 2; Mrs. J. Handley, Claret of Oakvale, 3. One and under 2 years: B. O'Connor, Brilliant of Oakvale, 1; J. England, Pretty Boy of Cosey Camp, 2; Macfarlane Bros., Arym of Kilbirnie, 3. Bull calf, 6 and under 12 months: C. Keys, Radium of Sunnymeade, 1; A. Kent, Rosebud's Renown of Oakvale, 2; A. C. Payne, Heather's Heir of Springvale. Children's calf class: Bull calf, 6 and under 12 months—E. J. O'Connor, Jock of Oakvale. Sire and three of his progeny, 6 months and over: F. O. Hayter, Sovereign of Warden, 1; R. Mears, George of Nestlés, 2; A. C. Payne, Raleigh's Reflection of Glenthorn, 3. Group of 2 males, 6 months or over: B. O'Connor, 1; F. O. Hayter, 2; Macfarlane Bros., 3. Sires' progeny stakes group, three females or a male and 2 females, 1 year and over: B. O'Connor, 1; W. Middleton, 2. Champion Illawarra milking bull: Nestlé and Anglo-Swiss Milk Co., Royal George 2nd of Nestlé. Reserve champion bull: G. E. Chasling, Thor of Greyleigh. Heifer calf, 6 months and under 12 months: D. Spoor and Sons, Bella of Aurora, 1; F. O. Hayter, Fussy's Pride of Springfield, 2; B. O'Connor, Lady Jean of Oakville, 3. Children's calf class: Heifer, 6 and under 12 months—J. B. O'Connor, Elsie 7th of Oakvale. Bull, 4 years and over: G. E. J. Chaseling, Thor of Greyleigh, 1; W. Middleton, Gay Boy of Tyrone Villa, 2; F. O. Hayter, Sovereign of Warden, 3; Nestlé and Anglo-Swiss Co., Shamrock's Emblem of Berry, 4.

Jerseys (judge, W. Woodmason).—Cow, 5 years and over, in milk: J. Sinnamon, Oxford Barleycorn, 1; J. Williams, Carlyle Lady Lynn, 2; W. Spresser, Carnation Buttercup, 3; J. Sinnamon, Oxford Hazel, 4. Four and under 5 years: E. Burton and Sons, Oxford Golden Buttercup, 1; J. Duffield and Sons, Creole of Brooke Lodge, 2; W. Spresser, Carnation Lucy, 3. Three and under 4 years: J. Duffield and Sons, Goldie of Brooke Lodge, 1; H. H. Doman, Oxford Golden Rosette, 2; W. and D. Carr, Carlyle Larkspur, 3. Heifer, 2 and under 3 years, in milk: W. H. Mallet, Sultan's Pride of Burnleigh, 1; W. and D. Carr, Carlyle Larkspur 3rd, 2; E. Burton and Sons, Oxford Noble Buttercup, 3. One and under 2 years: W. Spresser, Carnation Golden Princess, 1; J. Sinnamon, Trinity Jewel, 2; J. Sinnamon, Trinity Barleycorn 2nd, 3. Cow, 4 years and over, in calf 6 months or dry: J. G. Henderson, Oxford Girl, 1; T. Mullen, Lady Lass 3rd, 2; J. Williams, Oxford Noble Dot 3rd, 3; E. Burton and Sons, Oxford Buttercup 4th, 4. Heifer, 3 and under 4 years, in calf or dry: J. Collins, Queen of Cocton, 1; E. Burton and Sons, Oxford Noble Belle, 2; J. Collins, Trinity Golden Star, 3. Cow, 3 and under 4 years, in calf 6 months or dry: J. Sinnamon,

Trinity Sultan's Lass. Heifer, 1 and under 2 years, dry: E. Burton and Sons, Oxford Golden Dot, 1; W. Spresser, Carnation Kittle Lucy, 2; Sinnamon, Trinity Popcorn, 3. Six and under 12 months: W. Spresser, Carnation Butterfly, 1; W. Spresser, Carnation Lucy's Queen, 2; J. Sinnamon, Trinity Rosetta, 3. Cow or heifer, Australian bred and sired: J. Sinnamon, Oxford Barleycorn, 1; E. Burton and Sons, Oxford Golden Butterfly, 2; J. G. Henderson, Oxford Girl, 3. Greatest yield of butter-fat for 24 hours: J. Williamson, Carlyle Lady Lynn, 1; J. Duffield and Sons, Talgai Creole, 2; J. Sinnamon, Oxford Hazel, 3; J. Sinnamon, Oxford Barleycorn, 4. Champion Jersey cow or heifer of Queensland: J. Sinnamon, Oxford Barleycorn. Reserve champion: E. Burton and Sons, Oxford Golden Buttercup. Bull, 3 and under 4 years: J. Sinnamon, Ginger Duke, 1; W. W. Mallett, Trinity Baron, 2; Mrs. M. Bull, Acacia Crusader, 3. Two and under 3 years: J. Sinnamon, Lord Attrey of Banzule, 1; J. Duffield and Sons, The Ace of Banzule, 2; E. Burton and Sons, Werribee Clementine's King, 3; J. E. Davey, Squire of Abbystead, highly commended. One and under 2 years; J. Collins, Retford K.C., 1; T. H. Petherick, Trinity Officer, 2; J. Sinnamon, Trinity Tomboy, 3; G. W. Young, Sultan's Knight of Brookland, highly commended. Bull calf, 6 and under 12 months: J. Sinnamon, Trinity Derby, 1; J. Sinnamon, Trinity Roadside, 2; J. Sinnamon, Trinity Nicola, 3. Children's calf class.—Bull, 6 and under 12 months: S. Mullen, Norwood La Sentis King, 1; C. H. Hay, Kenmore Prince, 2. Sire and three of his progeny: W. Spresser, Carnation Prince, 1; E. Burton and Sons, Oxford Golden Noble, 2; J. Duffield and Sons, The Ace of Banzule, 3. Group, 2 males 6 months or over and 6 females: J. Sinnamon, 1; E. Burton and Sons, 2; Mrs. M. Ball, 3. Sire's progeny stakes group, 3 females or 1 male and 2 females: E. Burton and Sons, 1; J. Sinnamon, 2. Champion Jersey bull of Queensland: H. M. Bray, Oxford Jubilee's Palatine. Reserve champion: J. Sinnamon, Lord Attrey of Banzule. Bull, 4 years and over: H. M. Bray, Oxford Jubilee's Palatine, 1; E. Burton and Sons, Oxford Golden Noble, 2; W. and D. Carr, Empire of Woodside, 3; W. Spresser, Carnation Prince, 4. Children's calf class.—Heifer calf, 6 and under 12 months: E. M. Hay, Kenmore Princess, 1; R. J. Hay, Kenmore Songstress, 2; R. W. Mollett, Sweetheart of Burnleigh, 3.

Friesians (judge, J. H. S. Angus).—Cow, 4 years and over, in milk: F. G. Brown, S.C.P. Korndyke Lottie Canary, 1; F. G. Brown, Tsussie Clara Lynns' Echo, 2; Nestlé and Anglo-Swiss Co., Greta 6th of Nestlés, 3. Three and under 4 years, in milk: F. G. Brown, Cornucopia Doral Wayne 2nd, 1; P. P. Falt, Melba of Ryfield, 2. Heifer, 2 and under 3 years, in milk: Grindles Ltd., Hamburg 2nd of St. Athan, 1; F. G. Brown, Nooroombin Tsussie Echo, 2. Cow, 3 years or over, in calf 6 months or dry: P. P. Falt, Dairymaid, 1; G. Newman, Pansy of St. Athan, 2; Grindles Ltd., Lady Creamelle, 3. Heifer, 2 and under 3 years, dry: G. Newman, Moonlight 4th of St. Athan, 1; R. C. Philp and R. Betts, Tulip of Hazeldean, 2. One and under 2 years: J. M. Falt, Queenie of Ryfield, 1; E. C. McConnel, Cressbrook Camilla Regina, 2; Nestlé and Anglo-Swiss Co., Milkmaid of Nestlés, 3. Heifer calf, 6 and under 12 months: Grindles Ltd., Creamelle's Pride of Wolston, 1; E. J. Wecker, Brookdale Cadalic Queen, 2; S. H. Hosking, Gwithian Hilma 4th, 3; F. Pearce, Duchess of Oakvale, highly commended. Children's calf class: Heifer calf, 6 and under 12 months—F. Pearce, Pride of Oakvale, 1; J. H. Jorgensen, Oaklea Noreen 3rd of Ryfield, 2; W. Wecker, Martha of Glen Carmal, 3. Cow or heifer giving the greatest yield of butter-fat for 24 hours: P. P. Falt, Oaklea Noreen, 1; F. G. Brown, S.C.P. Korndyke Lottie Canary, 2; P. P. Falt, Melba of Ryfield, 3. Champian Friesian cow or heifer: P. P. Falt, Dairymaid. Reserve champion: G. Newman, Pansy of St. Athan. Bull, 4 years and over: G. Newman, Dominion Domino's Dutch Boy, 1; Grindles Ltd, Black Prince, 2; E. J. Wecker, Prince Colantha Oaklea, 3. Three and under 4 years: G. Newman, Pied Rock, 1; G. P. Falt, Dirk De Kol of Ryfield, 2; R. G. McLeod, Menelaus of St. Athan, 3. Two and under 3 years: F. G. Brown, Mooroombin Tsussie Lyon's Echo, 1; F. Pearce, Damon of St. Gwithian, 2. One and under 2 years: A. Aitchison, Pontiac of St. Gwithian, 1; G. Newman, Briton of St. Athan, 2; G. Newman, Apollinaris of St. Athan, 3. Six and under 12 months: J. P. Jorgensen, Show Lad of Ryfield, 1; E. C. McConnel, Cressbrook Puck, 2; Nestlé and Anglo-Swiss Co., Desmond of Nestlés, 3. Children's calf class: Bull calf, 6 and under 12 months—W. Wecker, Netherland Prince Colantha. Sire and three of his progeny, 6 months and over: G. Newman, Dominion Domino's Dutch Boy, 1;

P. P. Falt, Bell de Kol Ongarue, 2; R. C. Philp and R. Betts, Duke of Brussels of Berry, 3. Group, 2 males 6 months and over and 5 females 6 months and over: G. Newman 1, F. G. Brown 2. Sires' progeny stakes group, 3 females or 1 male and 2 females, 1 year and over: G. Newman 1, R. C. Philp and R. Betts 2, S. H. Hosking 3. Champion Friesian bull of Queensland: Dominion Domino's Dutch Boy. Reserve champion: G. Newman, Pied Rock.

Ayrshires (judge, J. Pritchard).—Cow, 5 years old and over, in milk: Anderson Bros., Juliette of Fairview, 1; Carr Bros., Rosalind of Wanora, 2; J. Holmes, Belle of Longlands, 3; J. Holmes, Blanche of Longlands, 4. Four and under 5 years, in milk: J. Holmes, Blonde of Longlands, 1; Anderson Bros., Lassie Jean of Fairview, 2. Three and under 4 years: J. Holmes, Tidy 2nd of Longlands, 1; J. C. Mann, Beryl's Pride of Crescent Farm, 2; J. Brownlie, Fantasy of Marinya, 3. Heifer, 2 and under 3 years: Feuerriegel Bros., Tina of Marivale, 1; J. Holmes, Jeanette of Marinya, 2. Cow, 4 years old or over, in calf 6 months or dry: P Bell, Agnes of Fairfield, 1; P. Bell, Beauty 3rd of St. Helena, 2; J. Holmes, Rosalind 2nd of Longlands, 3; J. C. Mann, Beryl of Crescent Farm, 4. Three and under 4 years: J. Holmes, Bella of Longlands. Heifer, 2 and under 3 years, in calf or dry: J. C. Mann, Beryl's Gem of Crescent Farm, 1; J. Holmes, Beauty of Longlands, 2; J. Holmes, Quiver 2nd of Marinya, 3. One and under 2 years: J. C. Mann, Daisy of Crescent farm, 1; J. C. Mann, Snowball of Crescent Farm, 2; G. Bell, Pearl 2nd of Longlands, 3. Heifer calf, 6 and under 12 months: J. Holmes, Betty of Longlands, 1; J. Holmes, Belle 2nd of Longlands, 2; J. C. Mann, Heather Spray of Crescent farm, 3. Ayrshire Derby Sweepstakes: Feuerriegel Bros., Tena of Merivale. Cow or heifer giving the greatest yield of butter: J. Holmes, Rosalind 2nd of Longlands. Champion Ayrshire cow or heifer of Queensland: Anderson Bros., Juliette of Oakbank. Reserve champion: P. Bell, Agnes of Fairfield. Bull, 4 years and over: P. Bell, Prince Boy of Longlands, 1; Anderson Bros., Royalist of Wanora, 2; Carr Bros., Master Gay Boy, 3. Three and under 4 years: J. Holmes, Prince Boy of Fairview, 1; J. Brownlie, Ross of Lowlands, 2; P. Bell, Jamie of Fairfield, 3. Two and under 3 years: J. C. Mann, Heather Boy of Crescent Farm, 1; H.M. Penal Establishment at St. Helena, St. Helena Tina's Earl, 2; P. Bell, Trumps of Bellevue, 3. One and under 2 years: H.M. Penal Establishment at St. Helena, St. Helena Bruce, 1; H. E. Luck, Bonnie Boy of Marinya, 2; H.M. Penal Establishment at St. Helena, St. Helena Gallant, 3. Bull calf, 6 and under 12 months: H.M. Penal Establishment, St. Helena Marshal, 1; J. Holmes, Tomboy of Longlands, 2; H.M Penal Establishment at St. Helena, St. Helena Mischief Boy, 3. Group, sire and three of his progeny, 6 months old and over: P. Bell, Prince Boy of Longlands, 1; J. Holmes, Prince Boy of Fairfield, 2. Two males, 6 months or over: J. Holmes, 1; J. C. Mann, 2. Sires' progeny stakes groups, 3 females or 1 male and 2 females: Anderson Bros. and J. Holmes, tie, 1. Champion Ayrshire bull of Queensland: P. Bell, Prince Roy of Lowlands. Reserve champion bull: Anderson Bros., Royalist of Wanora.

Guernseys (judge, E. Burton).—Cow, 3 years and over, in milk: E. S. Webster, Peggy 3rd of Belmont, 1. Three years and over, in calf six months or dry: Jackson and Schofield, Ivy 2nd, 1; E. S. Webster, Necklace of Woollongbar, 2. Heifer, 2 and under 3 years: A. Cooke, Shamrock 6th, 1; A. Cooke, Rohais, Keepsake of Kelvin, 2. Two and under 3 years: Jackson and Schofield, Mona of Bexley, 1; A. Cooke, Fashion of Boorie, 2. One and under 2 years: Jackson and Schofield, Mary of Bexley, 1; E. S. Webster, Minnamurra Queen, 2. Bull, 3 years and over: Jackson and Schofield, Montrose Sequel, 1; E. S. Webster, Air King of Woollongbar, 2. Two and under 3 years: A. Cooke, Victor of Woollongbar, 1. One year and under 2: Jackson and Schofield, Donnington Boy, 1. Champion Guernsey bull: Jackson and Schofield, Montrose Sequel. Reserve champion bull: A. Cooke, Victor of Woollongbar. Bull calf, 6 months and under 12 months: Jackson and Schofield, Captain of Bexley, 1; Jackson and Schofield, Lieutenant of Bexley, 2. Group of 1 male and 4 females: S. Cooke 1. Heifer, 6 and under 12 months: Jackson and Schofield, Coquette, 1; E. S. Webster, Minnamurra Eclipse, 2. Champion Guernsey cow or heifer of Queensland: Jackson and Schofield, Ivy 2nd. Reserve champion: Jackson and Schofield, Mona of Bexley. Champion Guernsey bull of Queensland: Jackson and Schofield, Montrose Sequel. Reserve champion: A. Cooke, Victor of Woollongbar.

HORSES.

Stud trotters and pacers (judge, Mr. H. J. Gidney).—Stud book stallion, 6 years and over, with public record of 2 mins. 35 secs. to the mile or better: J. Rice, Rex Wilkes, 1; J. T. Scrymgeour, St. Lucia Lad, 2. Stallion, 5 years and over, tested for speed, conformation, and action over 1 mile: F. Cook, Longford. Stallion, 3 years, tested for speed, conformation, and action over 1 mile: W. G. Arnold, Delor Rex; time, 4 mins. 20¼ secs. Mare, 5 years old: J. Rice, Ella Wilkes, 1; W. J. Young, Golden Queen, 2. Filly, 3 years: S. E. Green, Roma's Pride, 1; R. Smythe, Purplewood, 2. Family group, sire and two of his progeny: J. Rice, Rex Wilkes, 1. Champion trotting stallion: J. Rice, Rex Wilkes. Reserve Champion: J. T. Scrymgeour, St. Lucia Lad. Champion trotting mare: J. Rice, Ella Wilkes. Reserve champion: W. J. Young, Golden Queen.

Heavy draught horses, Clydesdales (judge, Mr. R. Tait).—Stallion, 5 years and over: A. T. Creswick, Wendermere Boy Kennedy, 1; A. T. Creswick, Captain Dale, 2; J. H. Kilvington, Pride o' Glenore, 3. Stallion, 4 years: G. Elliot, Statesman. Stallion, 3 years: A. T. Creswick, Major, 1; W. Irvine, Young Wendermere, 2. Colt, 2 years: W. Frood, Glentyre, 1; G. Elliot, Opportunity, 2. Colt, 1 year: J. H. Kelvington, Willie. Mare, 5 years and over: J. H. Kelvington, Winsome Baroness, 1; G. Elliot, Lady Ullus, 2. Mare, 4 years: G. Elliot, Lady Meta. Brood mare: J. Hamilton, Heather Belle, 1; J. H. Kelvington, Maiden Hair, 2. Filly, 3 years: G. Elliot, Lady Rangatira, 1; J. H. Kelvington, Madge, 2. Filly, 2 years: A. T. Creswick, Florrie, 1; J. H. Kelvington, Gipsy, 2. Family group, sire and 2 progeny: J. H. Kelvington, Pride o' Glenore, 1. Champion draught stallion: A. T. Creswick, Wendermere Boy Kennedy. Reserve champion: A. T. Creswick, Major. Champion draught mare: A. T. Creswick, Beryl. Reserve champion: J. H. Kilvington, Winsome Baroness.

Stud ponies (judge, Mr. P. E. Thorne).—Stallion, any age, exceeding 14 hands, to be driven in harness: A. T. Noyes, Robin Hood, 1; Mrs. T. Simpson, The Welshman, 2. Stallion, any age, to be led: H. E. Cox, Commandant, 1; J. C. Hobbs, Don, 2. Any age, not exceeding 13 hands: A. T. Noyes, Robin Hood, 1; H. Arndt, Black Pastel, 2. Any age, not exceeding 12 hands: C. J. Hobbs, Don, 1; Mrs. T. Simpson, The Welshman, 2. Pony stallion, any age, not exceeding 14 hands: E. Pocock, Ludo. Not exceeding 13 hands: E. Pocock, Ludo, 1; W. H. Maxwell, Welsh Gleam, 2. Not exceeding 12 hands: F. Tucker, Bonnie Boy. Champion pony stallion: E. Pocock, Ludo.

Welsh Ponies.—Stallion, not exceeding 14 hands: A. T. Noyes, Robin Hood, 1; Mrs. T. Simpson, The Welshman, 2. Champion Welsh pony stallion: A. T. Noyes, Robin Hood. Reserve champion: Mrs. T. Simpson, The Welshman.

Pony Mares.—Brood mare, not exceeding 14 hands: L. Dobson, Llew Lass, 1; M. Livingstone, Trixie, 2. Not exceeding 13 hands: Miss A. Mullan, Gold Top, 1; R. C. Fog, Girlie, 2. Not exceeding 12 hands: A. T. Noyes, Banglet, 1; W. Eaves, Blue Bell, 2. Champion pony mare: Miss A. Mullan, Gold Top. Reserve champion: L. Dobson, Llew Lass.

Thoroughbreds (judge, H. J. Gidney).—Stallion, 4 years and over, best adapted for improving racing stock: M. F. Yore, Polybius, 1; T. Jennings, Amberdown, 2; W. Glasson, Lilyveil highly commended. Four years and over, most suitable for getting horses for military purposes: T. Jennings, Amberdown, 1; J. P. Curry, Ladomond, 2. Colt, 2 years: E. G. Blume. Colt or filly, 2 years: E. G. Blume. Mare, 4 years and over: E. G. Blume, Lady Shepherd, 1; M. Livingstone, Bonnie Wasa, 2. Filly, 3 years: M. Livingstone, Malanganee. Two years: M. Livingstone. Champion thoroughbred stallion: M. F. Yore, Polybius. Reserve champion: T. Jennings, Amberdown. Champion thoroughbred mare: E. G. Blume, Lady Shepherd. Reserve champion mare: M. Livingstone, Malanganee.

SHEEP.

Stud Sheep (judges, Donald Gunn and W. A Nason).—Merinos—Strong woolled (unhoused) ram, 3 years and over: R. Lord, 1 and 2. Two years and under 3: R. P. Lord, 1, 2, and 3. Under 2 years, to have been shorn as a lamb: R. P. Lord, 1 and 2. Ewe, 3 years and over: R. P. Lord, 1 and 2. Two and under 3: R. P. Lord, 1 and 2. Under 2 years, to have been shorn as a lamb: R. P. Lord. Medium woolled (unhoused) ram, 3 and over: R. P. Lord, 1 and 2. Two and under 3: R. P. Lord, 1 and 2. Under 2, to have been shorn as a lamb: R. P. Lord, 1 and 2. Ewe, 3 years and over: R. P. Lord, 1 and 2. Two and under 3: R. P. Lord, 1 and 2. Under 2, to have been shorn as a lamb: R. P. Lord. Fine woolled (unhoused) ram, 3 and over: R. P. Lord, 1 and 2. Two and under 3: H. M. Collins, 1; R. P. Lord, 2 and 3. Under 2, to have been shorn as a lamb: R. P. Lord. Ewe, 3 and over: R. P. Lord, 1 and 2. Two and under 3: R. P. Lord, 1 and 2.

Championships.—Strong woolled (unhoused) ram, champion and reserve: R. P. Lord. Ewe, champion and reserve: R. P. Lord. Medium woolled (unhoused) ram, champion and super. champion and reserve: R. P. Lord. Ewe, champion and reserve: R. P. Lord. Fine woolled (unhoused) ram, champion: H. M. Collins; reserve, R. P. Lord. Ewe, champion and reserve: R. P. Lord.

Fats (judge, W. A. Nason).—Pen of five merino wethers, over 50 lb. weight: H. C. Taylor, 1 and 2. Pen of five merino wethers, under 50 lb. weight: Whitney Pastoral Company, 1; W. B. Beel, 2. Pen of five merino wethers, most suitable for freezing: G. Tathem, 1; H. C. Taylor, 2. Pen of five merino wethers, most suitable for butcher's trade: H. C. Taylor, 1 and 2. Pen of five crossbred wethers, 70 lb. weight: J. H Fairfax. Special prize, pen of five crossbred wethers, all one cross, of freezing quality: J. H. Fairfax. Special prize, pen of five wethers most suitable freezing: G. Tathem, 1; H. C. Taylor, 2. Pen of five crossbred lambs, suitable for export as freezers, averaging 38 lb.: J. H. Fairfax, 1; W. L. Stirling, 2. Pen of five crossbred lambs, irrespective of weight: J. H. Fairfax, 1; W. L. Stirling, 2. Special prize, pen of ten fat lambs, most suitable for export, from 28 to 40 lb.: Stirling Bros. Pen of five lambs, any breed, most suitable freezing: J. H. Fairfax, 1; W. L. Stirling, 2.

Single Exhibits.—Heaviest crossbred wether: R. Ralston, 1; W. L. Stirling, 2. Heaviest merino wether: H. C. Taylor, 1 and 2. Heaviest crossbred ewe: J. H. Fairfax. Heaviest merino ewe: H. C. Taylor, 1 and 2.

SWINE.

Improved Berkshires (judge, R. Fennell).—Boars, 2 years and over: J. H. Cowen, Goomalibee Nugget, 1; W. J. Warburton, Northgate Item 2nd, 2. One and under 2 years: W. J. Warburton, Brentwood Star, 1; J. H. Cowen, Preston Sunshine, 2. Six months and under 1 year: W. J. Warburton, Dick, 1; W. J. Warburton, Cloud, 2. Under 6 months: J. H. Cowen, Cremorne Mat, 1; L. S. Ducat, Waterview Don, 2. Pen of three Berkshire boars: L. S. Ducat. Boar and three of his progeny: W. J. Warburton, Northgate Item 2nd, 1; J. H. Cowen, Preston Sunshine, highly commended. Champion boar: J. H. Cowen, Goomalibee Nuggett. Reserve champion: W. J. Warburton, Brentwood Star. Sows, 2 years and over: E. Burton and Sons, Oxford Marie, 1; J. H. Cowen, Lawrence Countess, 2; Queensland Agricultural College, Brentwood Purity, highly commended. One year and under 2 years: W. J. Warburton, Northgate Belle 2nd, 1; L. S. Ducat, Britannia Ruby, 2. Over 6 and under 12 months: W. J. Warburton, Floria, 1; W. J. Warburton, Jean, 2. Under 6 months: W. J. Warburton, Pet, 1; J. H. Cowen, Cremorne Patricia, 2. Sow, any age, in milk, with litter not over ten weeks old (not less than six suckers): Northgate Benita 2nd, 1; Northgate Virtue, 2. Pen of three Berkshire sows, under 16 weeks: J. H. Cowen. Champion sow: W. J. Warburton, Northgate Belle 2nd. Reserve champion: E. Burton and Sons, Oxford Marie.

Yorkshires.—Boars, 2 years and over: W. J. Warburton, Northgate My Lad, 1; J. G. Weller, Northgate Aussie, 2. One and under 2 years: W. J. Warburton, Newington Adventure, 1; W. J. Warburton, Northgate Fanciful, 2. Six and under 12 months: W. J. Warburton, Northgate Bob, 1; W. J. Warburton, Northgate Star, 2. Under 6 months: W. J. Warburton, Ted, 1; Queensland Agricultural College, 2. Pen of three Yorkshire boars, under 16 weeks: W. J. Warburton, 1; Queensland Agricultural College, 2. Boar and three of his progeny (sex optional): W. J. Warburton, Northgate My Lad. Champion boar: W. J. Warburton, Northgate My Lad. Reserve champion: W. J. Warburton, Northgate Star. Sows, 2 years and over: W. J. Warburton, Northgate Shirley. One year and under 2 years: W. J. Warburton, Northgate Florrie. Six and under 12 months: Northgate Jess. Under 6 months: Queensland Agricultural College, 1; W. J. Warburton, Nora, 2. Sow, any age, in milk, with litter of not less than six suckers and not over 10 weeks old: W. J. Warburton, Northgate Joan, 1; Queensland Agricultural College, Gatton, Mistress Gaiety, 2. Pen of three Yorkshire sows, under 16 weeks: Queensland Agricultural College, 1; Warburton, 2. Champion: W. J. Warburton, Northgate Florrie. Reserve champion: W. J. Warburton, Northgate Shirley.

Tamworths.—Boars, 2 years and over: Queensland Agricultural College, Knowle Chatham, 1; J. H. Whittaker, Sandy McQueen, 2. One and under 2 years: J. H. Whittaker, Broxburn King. Six and under 12 months: J. H. Whittaker, Broxburn Lad. Under 6 months: J. H. Whittaker, Broxburn Baron. Pen of three Tamworth boars, under 16 weeks: Queensland Agricultural College. Boar and three of his progeny: Queensland Agricultural College, Knowle Chatham and progeny. Champion: Queensland Agricultural College, Knowle Chatham. Reserve champion: J. H. Whittaker, Sandy McQueen. Sows, 2 years and over: J. H. Whittaker, Manning Ruby. One year and under 2 years: J. H. Whittaker, Braxburn Myra, 1; Queensland Agricultural College, Gatton Princess, 2. Six months and under 12 months: Queensland Agricultural College 1; J. H. Whittaker, Broxburn Lass, 2. Under 6 months: J. H. Whittaker, Broxburn Favourite. Any age, in milk, with litter not less than six suckers and not over 10 weeks old: J. H. Whittaker, Broxburn Queen. Pen of three Tamworth sows, under 16 weeks: J. H. Whittaker. Champion sow: J. H. Whittaker, Broxburn Myra, 1. Reserve.

Duroc-Jerseys.—Boar, any age: F. G. Brown, Nooroombin Lad. Sow, any age: F. G. Brown, 1 and 2.

Miscellaneous.—Three bacon pigs, any breed, 100 to 130 lb. dressed weight: A. Gratt, 1; H. B. Baldwin, 2. Three porker pigs, 60 to 80 lb.: Queensland Agricultural College, 1; C. Bright, 2.

HAM, BACON, AND LARD.

(Judge, G. S. Stening.)

Bacon, factory cured, six sides: J. C. Hutton, Proprietary, Limited, Brisbane, 94 points, 1; J. C. Hutton Proprietary, Limited, Canterbury, N.S.W., 93 points, 2.

Hams, factory cured, six: J. C. Hutton, Proprietary, Limited, Brisbane, 93½ points, 1; J. C. Hutton, Proprietary, Limited, Canterbury, N.S.W., 92 points, 2.

Sausage, smoked, 14 lb.: Queensland Co-operative Bacon Company, Limited, 1 and 2.

Lard, in bladders, 14 lb.: Queensland Co-operative Bacon Company, Limited, 1 and 2, with 96½ and 96 points, respectively.

FRUIT-PACKING COMPETITION FOR BOYS AND GIRLS.

Two cases of oranges, open to past students of the rural schools and those over 14 years of age now attending school: N. Dunning, Palmwoods, 92 points, 1; L. Atkinson, Palmwoods, 85 points, 2; M. Young, Palmwoods, 82 points, 3; Am. Miler, Palmwoods, 74 points, highly commended; L. Atkinson, Palmwoods, 74 points, highly commended. Two cases of oranges, open to students of the rural schools under 14 years of age: H. Watt, Mapleton, 93 points, 1; H. Wallace, Palmwoods, 90 points, 2; G. Butt, Montville, 86 points, 3; A. Cook, Mapleton, 84 points, highly commended; L. Wyer, Mapleton, 77 points, highly commended; M. Thompson, Montville, 78 points, highly commended. District exhibits of fruit, pineapples: Montville. Citrons: Montville. Fruit packed for the market: Montville. Bananas: Wynnum and Manly. In a collection of bananas, pineapples, citrus fruits, custard apples, papaws, strawberries, and other fruits, packing and general display being taken into account: Woombye, Nambour, and Yandina district, 145 points, 1; Montville district, 116 points, 2; Redlands district, 115 points, 3.

DISTRICT FRUIT EXHIBIT.

GOOD COMPETITION.

SUCCESS OF WOOMBYE-NAMBOUR-YANDINA.

The judging in the district exhibit of fruit was completed on Tuesday, and the aggregate of the detailed points resulted in a win for the Woombye, Nambour, and Yandina district exhibit, with a total of 145 points out of a possible 200. The Montville Fruitgrowers', Farmers, and Progress Association was second with 116, and Redlands Area Council exhibit third with 115. Details:—

—	Possible Points.	Woombye, Nambour and Yandina District.	Montville Fruit-growers' Farmers' Progress Assoc.	Redland's Area Council.	Buderim Mountain District.	Cooran, Pinbarren, and Kin Kin.
Bananas	35	12	14	12	15	25
Pineapples	35	30	23	20	15	15
Citrus fruits	35	30	20	20	19	1
Custard apples	10	4	6	9	5	..
Papaws	10	7	7	7	6	5
Strawberries	10	7	..	8	6	..
All other fruits	10	8	6	2	7	2
Grading and packing	35	30	25	27	16	10
General display	20	17	15	10	8	5
Total	200	145	116	115	97	63

FERTILISERS—UNIT VALUES—PRICE PER TON.

By F. F. COLEMAN, Officer in Charge, Seeds, Fertilisers, and Stock Foods Investigation Branch.

Farmers and other buyers would do well to note that every licensed dealer must give the buyer an invoice certificate, and affix to every package a plainly printed label, each of which is required to set out the weight, name of fertiliser, also the chemical analysis stating the percentage of nitrogen, phosphoric acid, and potash and the *forms in which they respectively occur.*

In the case of bonedust, bonemeals, and meatworks fertiliser, other than dried blood, the percentage of fine and coarse material should be declared.

On all invoice certificates and labels the amounts of fertilising ingredients have to be stated in a uniform manner, as the old expressions—like bone phosphate, tricalcic phosphate, ammonia, ammonium sulphate, potassium sulphate, &c.—are liable to mislead the farmer. The Act provides for the statement of the valuable fertilising ingredients in percentage amounts of **Nitrogen** (N), **Potash** (K_2O), **Phosphoric Acid** (P_2O_5).

In the case of **agricultural lime** the percentage of coarse material and fine material must be stated, together with the percentage of lime as **lime carbonate** ($CaCO_3$), and in the case of gypsum the percentage of **lime sulphate** ($CaSO_4$). With burnt lime or quick lime the percentage of **calcium oxide** (CaO) must be declared.

The Fertilisers Acts do not prescribe standards for fertilisers. Therefore the value of any particular brand or kind can only be calculated on the fertilising constituents guaranteed by the vendor to be present. In particular, it is to be noted that, although meatworks and fertilisers of a like nature vary from time to time, they are still sold under the same brand or trade mark, and their actual value per ton may be up or down in accordance with the percentage of nitrogen, phosphoric acid, and potash that they contain.

The **monetary manurial value** per ton has been fixed for some time under "*The Profiteering Prevention Act of* 1920." The **unit values**, which are the cost price of 1 per centum of the various fertilising constituents per ton, or the actual cost value of every 22·4 lb. of such constituent.

The present unit values were fixed by Prices Notifications Nos. 386 and 396, which appeared in the "Government Gazettes" of 7th October, 1922, and 4th November, 1922, and are as follows :—

The maximum price f.o.b. or f.o.r. to any buyer of any fertiliser as specified herein, of half-ton lots and over, shall be based on registered analysis or certified actual analysis, as under:—

	Unit Value. s.	d.
Per Unit of Nitrogen (N)—		
As Nitrate of Soda	30	0
As Ammonium Sulphate	20	0
As dried blood, or blood manure only	24	0
As bone, flesh, blood and offal, fine	24	0
As bone, flesh, blood and offal, coarse	20	0
As bone, flesh, blood and offal, unspecified	17	0
As bone, flesh, blood and offal, unspecified lumps	14	0
Per Unit of Phosphoric Acid (P_2O_5)—		
As Water Soluble in Superphosphate	8	6
As Citrate Soluble in Basic Superphosphate	8	6
As Citrate Soluble in Finely Ground Thomas Phosphate or Basic Slag	8	6
As Citrate Soluble in Finely Ground Mineral or Rock Phosphate	5	6
As Citrate Insoluble in Ground Mineral or Rock Phosphate	4	0
Unspecified	3	0
As Citrate Soluble in Finely Ground Island Phosphate and Guano	5	6
As bone, fine	5	6
As bone, Island Phosphate and Guano, coarse	4	0
As bone, Island Phosphate and Guano, unspecified and unspecified lumps	3	0
Per Unit of Potash (K_2O)—		
As Muriate	8	0
As Sulphate	9	6
Unspecified, Water Soluble	7	6
Unspecified, soluble in Hydrochloric Acid	4	3
Per Unit of Lime (CaO)—		
As Ground Carbonate (in mixtures only)	1	0
As Sulphate (in mixtures only)	1	3

DEFINITIONS.

"Fine" to signify in the case of—

(a) Thomas phosphate or basic slag, particles smaller than one-hundredth of an inch.

(b) Rock phosphates and guano phosphates, particles smaller than one-fiftieth of an inch.

(c) Bone, flesh, and offal, particles smaller than one-fiftieth of an inch.

"Coarse" to signify particles larger than one-fiftieth of an inch and smaller than one-tenth of an inch.

"Unspecified" to signify particles larger than one-tenth of an inch and smaller than one-half of an inch.

"Unspecified lumps" to signify particles larger than one-half inch.

The "unit value" for all fertilisers applies in an area within a radius of 10 miles from the G.P.O., Brisbane, and for all meatworks products, and guano and island phosphates, or any other natural product, to the areas in which the factory is located or the product is obtained.

For all fertilisers scheduled, the state of fineness must be declared by stating the percentage amounts of "fine," "coarse," and "unspecified" particles in the product.

For fertilisers like superphosphates, nitrate of soda, ammonium sulphate, and mixed fertilisers containing any of these fertilisers liable to destroy the bags in short periods, a rebagging charge of 13s. per ton may be allowed, if such rebagging has actually become necessary.

Mixed artificial fertilisers containing superphosphates, and ammonium sulphate or muriate of potash, or both, or for any manure other than basic superphosphate, specially mixed for trade purposes, an extra charge of £1 per ton for mixing may be made, and for basic superphosphate a special mixing charge of thirty shillings (30s.) per ton may be made.

Dealers purchasing from meatworks or bacon factories or Island Phosphate and Guano companies or any other producers, and selling from stock, may charge in half-ton lots or over: 10 per cent. on maximum prices fixed.

Dealers and producers, selling from stock, may charge in lots of 1 cwt. and over, but less than half-ton, 1s. per cwt. extra on maximum prices fixed.

For fertiliser works at and north of Mackay, on account of increased cost of labour and handling, an extra additional charge of five (5) per cent. will be allowed to be made on the calculated total cost.

The maximum price that may be charged for any fertiliser can be easily ascertained on reference to the "Ready Reckoner for Fertilisers," from which it will be observed that the top lines give the various unit values, from 1s. to 30s., and the margin lines the percentages from ·1 of 1 per cent. to 20 per cent.

Assuming that a farmer purchases a ton of fertiliser and the analysis shown on the label is as follows:—

EASTERBY'S MIXTURE.

180 lb. net.

Nitrogen .. .. 7·7 per cent. as ammonium sulphate.

Phosphoric acid .. 7·0 per cent. as water soluble phosphoric acid.

Potash .. .. 7·7 per cent. as potassium sulphate.

A. SELLER, SUMMERTOWN.

The price can be calculated by first taking the top item of the analysis appearing on the label, which is Nitrogen as ammonium sulphate, the unit value of which is 20s. and the amount guaranteed to be present 7·7 per cent.

	£	s.	d.
On reference to the "Ready Reckoner" it will be found that—			
·7 per cent. at 20s. is given as	0	14	0
7 per cent. at 20s. is given as	7	0	0
The unit value of Phosphoric Acid water soluble is 8s. 6d. On reference to the 8s. 6d. column, it will be found that 7 per cent. at 8s. 6d. is given as	2	19	6
The unit value of Sulphate of Potash is 9s. 6d. From the label it appears that the vendor guarantees 7·7 per cent. to be present, the buyer will therefore take ·7 per cent. at 9s. 6d. which is given as	0	6	8
and 7 per cent. at 9s. 6d. which is given as	3	6	6
add £1 per ton for mixing charge	1	0	0
Cost of one ton at Brisbane	£15	6	8

On the sale of bonedust, bonemeals, and meatworks fertiliser, other than dried blood, the vendor should set out on both the label and invoice certificate the percentage of fine and coarse material as defined. For example, a label showing a mixture of meatworks fertiliser and potash is given.

MEATWORKS POTASH MIXTURE.

140 lb. net.

Nitrogen as bone, flesh, blood, and offal ..	5·2 per cent.
Phosphoric acid—Total	12·7 per cent.
Potash as potassium sulphate	7·5 per cent.
Fine material	55·0 per cent.
Coarse material	40·0 per cent.
Unspecified material	5·0 per cent.

A. SELLER, SUMMERTOWN.

From the above label it will be noted that the fineness is expressed as 55 per cent. fine, 40 per cent. coarse, and 5 per cent. unspecified. On reference to the unit values it will be observed that the unit value of nitrogen as bone, flesh, blood, and offal, fine is 24s., coarse 20s., unspecified 17s., and in phosphoric acid as bone, fine 5s. 6d., coarse 4s., unspecified 3s. To ascertain the price, it is therefore first necessary to find 55, 40, and 5 parts of 5·2 units of nitrogen, and in the phosphoric acid the same percentages of 12·7 units which is the total amount of phosphoric acid declared by the vendor to be present.

When working out the price per ton, it is to be remembered that one unit is 1 per cent. of one ton; therefore the cost of the fertiliser is calculated in the following manner:—

Total nitrogen 5·2 units divided into 55, 40, and 5 parts—

	Calculate as		£ s. d.	£ s. d.
5·2 ·55 260 260 2·860 = 2·86	2·9	Fine at 24s.	3 9 7	
5·2 ·4 2·08 = 2·08	2·1	Coarse at 20s.	2 2 0	
5·2 ·05 ·260 = ·26	·2	Unspecified at 17s. ..	0 3 5	
				5 15 0

Total phosphoric acid 12·7 units divided into 55, 40, and 5 parts—

	Calculate as			
12·7 ·55 635 635 6·985 = 6·985	7·0	Fine at 5s. 6d.	1 18 6	
12·7 ·4 5·08 = 5·08	5·1	Coarse at 4s.	1 0 5	
12·7 ·05 ·635 = ·635	·6	Unspecified at 3s. ..	0 1 10	
				3 0 9

7·5 units potash as potassium sulphate—

7·5 at 9s. 6d.	3 11 3
Mixing charge	1 0 0
Price per ton at works	£13 7 0

For fertiliser works at and north of Mackay an additional charge of five (5) per cent. may be added to the calculated total cost.

When the Buyer is in Doubt.

Any farmer in doubt as to the quality or any other matter concerning any fertiliser that he has purchased, should at once write to the Department of Agriculture, Brisbane.

Samples under certain conditions laid down by the Regulations under the Acts may be sent to the Department for analysis. To a buyer, other than a dealer, the charge is only nominal. In most cases, however, the quickest and best method of deciding any point in connection with a purchase is to write to the Department giving the following particulars:—

Name of fertiliser :	Invoice certificate and label :
Name and address of seller :	Date of delivery :
Quantity purchased :	Name and address of buyer :

All correspondence should be addressed to—

The UNDER SECRETARY,

Department of Agriculture and Stock, Brisbane.

READY RECKONER FOR FERTILISERS.

%	£ s. d. 0 1 0	£ s. d. 0 1 3	£ s. d. 0 2 6	£ s. d. 0 3 0	£ s. d. 0 3 6	£ s. d. 0 4 0	£ s. d. 0 4 3	£ s. d. 0 4 6	£ s. d. 0 5 0	%
·1	0 0 1	0 0 1½	0 0 3	0 0 4	0 0 4	0 0 5	0 0 5	0 0 5	0 0 6	·1
·2	0 0 2	0 0 3	0 0 6	0 0 7	0 0 8	0 0 10	0 0 10	0 0 11	0 1 0	·2
·3	0 0 4	0 0 4½	0 0 9	0 0 11	0 1 1	0 1 2	0 1 3	0 1 4	0 1 6	·3
·4	0 0 5	0 0 6	0 1 0	0 1 2	0 1 5	0 1 7	0 1 8	0 1 10	0 2 0	·4
·5	0 0 6	0 0 7½	0 1 3	0 1 6	0 1 9	0 2 0	0 2 1½	0 2 3	0 2 6	·5
·6	0 0 7	0 0 9	0 1 6	0 1 10	0 2 1	0 2 5	0 2 7	0 2 8	0 3 0	·6
·7	0 0 8	0 0 10½	0 1 9	0 2 1	0 2 5	0 2 10	0 3 0	0 3 2	0 3 6	·7
·8	0 0 10	0 1 0	0 2 0	0 2 5	0 2 10	0 3 2	0 3 5	0 3 7	0 4 0	·8
·9	0 0 11	0 1 1½	0 2 3	0 2 8	0 3 2	0 3 7	0 3 10	0 4 1	0 4 6	·9
1·0	0 1 0	0 1 3	0 2 6	0 3 0	0 3 6	0 4 0	0 4 3	0 4 6	0 5 0	1·0
2·0	0 2 0	0 2 6	0 5 0	0 6 0	0 7 0	0 8 0	0 8 6	0 9 0	0 10 0	2·0
3·0	0 3 0	0 3 9	0 7 6	0 9 0	0 10 6	0 12 0	0 12 9	0 13 6	0 15 0	3·0
4·0	0 4 0	0 5 0	0 10 0	0 12 0	0 14 0	0 16 0	0 17 0	0 18 0	1 0 0	4·0
5·0	0 5 0	0 6 3	0 12 6	0 15 0	0 17 6	1 0 0	1 1 3	1 2 6	1 5 0	5·0
6·0	0 6 0	0 7 6	0 15 0	0 18 0	1 1 0	1 4 0	1 5 6	1 7 0	1 10 0	6·0
7·0	0 7 0	0 8 9	0 17 6	1 1 0	1 4 6	1 8 0	1 9 9	1 11 6	1 15 0	7·0
8·0	0 8 0	0 10 0	1 0 0	1 4 0	1 8 0	1 12 0	1 14 0	1 16 0	2 0 0	8·0
9·0	0 9 0	0 11 3	1 2 6	1 7 0	1 11 6	1 16 0	1 18 3	2 0 6	2 5 0	9·0
10·0	0 10 0	0 12 6	1 5 0	1 10 0	1 15 0	2 0 0	2 2 6	2 5 0	2 10 0	10·0
11·0	0 11 0	0 13 9	1 7 6	1 13 0	1 18 6	2 4 0	2 6 9	2 9 6	2 15 0	11·0
12·0	0 12 0	0 15 0	1 10 0	1 16 0	2 2 0	2 8 0	2 11 0	2 14 0	3 0 0	12·0
13·0	0 13 0	0 16 3	1 12 6	1 19 0	2 5 6	2 12 0	2 15 3	2 18 6	3 5 0	13·0
14·0	0 14 0	0 17 6	1 15 0	2 2 0	2 9 0	2 16 0	2 19 6	3 3 0	3 10 0	14·0
15·0	0 15 0	0 18 9	1 17 6	2 5 0	2 12 6	3 0 0	3 3 9	3 7 6	3 15 0	15·0
16·0	0 16 0	1 0 0	2 0 0	2 8 0	2 16 0	3 4 0	3 8 0	3 12 0	4 0 0	16·0
17·0	0 17 0	1 1 3	2 2 6	2 11 0	2 19 6	3 8 0	3 12 3	3 16 6	4 5 0	17·0
18·0	0 18 0	1 2 6	2 5 0	2 14 0	3 3 0	3 12 0	3 16 6	4 1 0	4 10 0	18·0
19·0	0 19 0	1 3 9	2 7 6	2 17 0	3 6 6	3 16 0	4 0 9	4 5 6	4 15 0	19·0
20·0	1 0 0	1 5 0	2 10 0	3 0 0	3 10 0	4 0 0	4 5 0	4 10 0	5 0 0	20·0

READY RECKONER FOR FERTILISERS—*continued.*

%	£ s d. 0 5 6	£ s. d. 0 6 0	£ s. d. 0 7 0	£ s. d. 0 7 6	£ s. d. 0 8 0	£ s. d. 0 8 6	£ s. d. 0 9 0	£ s. d. 0 9 6	%
·1	0 0 7	0 0 7	0 0 8	0 0 9	0 0 10	0 0 10	0 0 11	0 0 11	·1
·2	0 1 1	0 1 2	0 1 5	0 1 6	0 1 7	0 1 8	0 1 10	0 1 11	·2
·3	0 1 8	0 1 10	0 2 1	0 2 3	0 2 5	0 2 7	0 2 8	0 2 10	·3
·4	0 2 2	0 2 5	0 2 10	0 3 0	0 3 2	0 3 5	0 3 7	0 3 10	·4
·5	0 2 9	0 3 0	0 3 6	0 3 9	0 4 0	0 4 3	0 4 6	0 4 9	·5
·6	0 3 4	0 3 7	0 4 2	0 4 6	0 4 10	0 5 1	0 5 5	0 5 8	·6
·7	0 3 10	0 4 2	0 4 11	0 5 3	0 5 7	0 5 11	0 6 4	0 6 8	·7
·8	0 4 5	0 4 10	0 5 7	0 6 0	0 6 5	0 6 10	0 7 2	0 7 7	·8
·9	0 4 11	0 5 5	0 6 4	0 6 9	0 7 2	0 7 8	0 8 1	0 8 7	·9
1·0	0 5 6	0 6 0	0 7 0	0 7 6	0 8 0	0 8 6	0 9 0	0 9 6	1·0
2·0	0 11 0	0 12 0	0 14 0	0 15 0	0 16 0	0 17 0	0 18 0	0 19 0	2·0
3·0	0 16 6	0 18 0	1 1 0	1 2 6	1 4 0	1 5 6	1 7 0	1 8 6	3·0
4·0	1 2 0	1 4 0	1 8 0	1 10 0	1 12 0	1 14 0	1 16 0	1 18 0	4·0
5·0	1 7 6	1 10 0	1 15 0	1 17 6	2 0 0	2 2 6	2 5 0	2 7 6	5·0
6·0	1 13 0	1 16 0	2 2 0	2 5 0	2 8 0	2 11 0	2 14 0	2 17 0	6·0
7·0	1 18 6	2 2 0	2 9 0	2 12 6	2 16 0	2 19 6	3 3 0	3 6 6	7·0
8·0	2 4 0	2 8 0	2 16 0	3 0 0	3 4 0	3 8 0	3 12 0	3 16 0	8·0
9·0	2 9 6	2 14 0	3 3 0	3 7 6	3 12 0	3 16 6	4 1 0	4 5 6	9·0
10·0	2 15 0	3 0 0	3 10 0	3 15 0	4 0 0	4 5 0	4 10 0	4 15 0	10·0
11·0	3 0 6	3 6 0	3 17 0	4 2 6	4 8 0	4 13 6	4 19 0	5 4 6	11·0
12·0	3 6 0	3 12 0	4 4 0	4 10 0	4 16 0	5 2 0	5 8 0	5 14 0	12·0
13·0	3 11 6	3 18 0	4 11 0	4 17 6	5 4 0	5 10 6	5 17 0	6 3 6	13·0
14·0	3 17 0	4 4 0	4 18 0	5 5 0	5 12 0	5 19 0	6 6 0	6 13 0	14·0
15·0	4 2 6	4 10 0	5 5 0	5 12 6	6 0 0	6 7 6	6 15 0	7 2 6	15·0
16·0	4 8 0	4 16 0	5 12 0	6 0 0	6 8 0	6 16 0	7 4 0	7 12 0	16·0
17·0	4 13 6	5 2 0	5 19 0	6 7 6	6 16 0	7 4 6	7 13 0	8 1 6	17·0
18·0	4 19 0	5 8 0	6 6 0	6 15 0	7 4 0	7 13 0	8 2 0	8 11 0	18·0
19·0	5 4 6	5 14 0	6 13 0	7 2 6	7 12 0	8 1 6	8 11 0	9 0 6	19·0
20·0	5 10 0	6 0 0	7 0 0	7 10 0	8 0 0	8 10 0	9 0 0	9 10 0	20·0

READY RECKONER FOR FERTILISERS—*continued.*

%	£ s. d. 0 10 0	£ s. d. 0 12 6	£ s. d. 0 14 0	£ s. d. 0 15 0	£ s. d. 0 16 0	£ s. d. 0 17 0	£ s. d. 0 17 6	£ s. d. 0 18 0	%
·1	0 1 0	0 1 3	0 1 5	0 1 6	0 1 7	0 1 8	0 1 9	0 1 10	·1
·2	0 2 0	0 2 6	0 2 10	0 3 0	0 3 2	0 3 5	0 3 6	0 3 7	·2
·3	0 3 0	0 3 9	0 4 2	0 4 6	0 4 10	0 5 1	0 5 3	0 5 5	·3
·4	0 4 0	0 5 0	0 5 7	0 6 0	0 6 5	0 6 10	0 7 0	0 7 2	·4
·5	0 5 0	0 6 3	0 7 0	0 7 6	0 8 0	0 8 6	0 8 9	0 9 0	·5
·6	0 6 0	0 7 6	0 8 5	0 9 0	0 9 7	0 10 2	0 10 6	0 10 10	·6
·7	0 7 0	0 8 9	0 9 10	0 10 6	0 11 2	0 11 11	0 12 3	0 12 7	·7
·8	0 8 0	0 10 0	0 11 2	0 12 0	0 12 10	0 13 7	0 14 0	0 14 5	·8
·9	0 9 0	0 11 3	0 12 7	0 13 6	0 14 5	0 15 4	0 15 9	0 16 2	·9
1·0	0 10 0	0 12 6	0 14 0	0 15 0	0 16 0	0 17 0	0 17 6	0 18 0	1·0
2·0	1 0 0	1 5 0	1 8 0	1 10 0	1 12 0	1 14 0	1 15 0	1 16 0	2·0
3·0	1 10 0	1 17 6	2 2 0	2 5 0	2 8 0	2 11 0	2 12 6	2 14 0	3·0
4·0	2 0 0	2 10 0	2 16 0	3 0 0	3 4 0	3 8 0	3 10 0	3 12 0	4·0
5·0	2 10 0	3 2 6	3 10 0	3 15 0	4 0 0	4 5 0	4 7 6	4 10 0	5·0
6·0	3 0 0	3 15 0	4 4 0	4 10 0	4 16 0	5 2 0	5 5 0	5 8 0	6·0
7·0	3 10 0	4 7 6	4 18 0	5 5 0	5 12 0	5 19 0	6 2 6	6 6 0	7·0
8·0	4 0 0	5 0 0	5 12 0	6 0 0	6 8 0	6 16 0	7 0 0	7 4 0	8·0
9 0	4 10 0	5 12 6	6 6 0	6 15 0	7 4 0	7 13 0	7 17 6	8 2 0	9·0
10·0	5 0 0	6 5 0	7 0 0	7 10 0	8 0 0	8 10 0	8 15 0	9 0 0	10·0
11·0	5 10 0	6 17 6	7 14 0	8 5 0	8 16 0	9 7 0	9 12 6	9 18 0	11·0
12·0	6 0 0	7 10 0	8 8 0	9 0 0	9 12 0	10 4 0	10 10 0	10 16 0	12·0
13·0	6 10 0	8 2 6	9 2 0	9 15 0	10 8 0	11 1 0	11 7 6	11 14 0	13·0
14·0	7 0 0	8 15 0	9 16 0	10 10 0	11 4 0	11 18 0	12 5 0	12 12 0	14·0
15·0	7 10 0	9 7 6	10 10 0	11 5 0	12 0 0	12 15 0	13 2 6	13 10 0	15·0
16·0	8 0 0	10 0 0	11 4 0	12 0 0	12 16 0	13 12 0	14 0 0	14 8 0	16·0
17·0	8 10 0	10 12 6	11 18 0	12 15 0	13 12 0	14 9 0	14 17 6	15 6 0	17·0
18·0	9 0 0	11 5 0	12 12 0	13 10 0	14 8 0	15 6 0	15 15 0	16 4 0	18·0
19·0	9 10 0	11 17 6	13 6 0	14 5 0	15 4 0	16 3 0	16 12 6	17 2 0	19·0
20·0	10 0 0	12 10 0	14 0 0	15 0 0	16 0 0	17 0 0	17 10 0	18 0 0	20·0

READY RECKONER FOR FERTILISERS—*continued.*

%	£ s. d. 0 19 0	£ s. d. 1 0 0	£ s. d. 1 1 0	£ s. d. 1 2 0	£ s. d. 1 3 0	£ s. d. 1 4 0	£ s. d. 1 5 0	£ s. d. 1 10 0	%
·1	0 1 11	0 2 0	0 2 1	0 2 2	0 2 4	0 2 5	0 2 6	0 3 0	·1
·2	0 3 10	0 4 0	0 4 2	0 4 5	0 4 7	0 4 10	0 5 0	0 6 0	·2
·3	0 5 8	0 6 0	0 6 4	0 6 7	0 6 11	0 7 2	0 7 6	0 9 0	·3
·4	0 7 7	0 8 0	0 8 5	0 8 10	0 9 2	0 9 7	0 10 0	0 12 0	·4
·5	0 9 6	0 10 0	0 10 6	0 11 0	0 11 6	0 12 0	0 12 6	0 15 0	·5
·6	0 11 5	0 12 0	0 12 7	0 13 2	0 13 10	0 14 5	0 15 0	0 18 0	·6
·7	0 13 4	0 14 0	0 14 8	0 15 5	0 16 1	0 16 10	0 17 6	1 1 0	·7
·8	0 15 2	0 16 0	0 16 10	0 17 7	0 18 5	0 19 2	1 0 0	1 4 0	·8
·9	0 17 1	0 18 0	0 18 11	0 19 10	1 0 8	1 1 7	1 2 6	1 7 0	.9
1·0	0 19 0	1 0 0	1 1 0	1 2 0	1 3 0	1 4 0	1 5 0	1 10 0	1·0
2·0	1 18 0	2 0 0	2 2 0	2 4 0	2 6 0	2 8 0	2 10 0	3 0 0	2·0
3·0	2 17 0	3 0 0	3 3 0	3 6 0	3 9 0	3 12 0	3 15 0	4 10 0	3·0
4·0	3 16 0	4 0 0	4 4 0	4 8 0	4 12 0	4 16 0	5 0 0	6 0 0	4·0
5·0	4 15 0	5 0 0	5 5 0	5 10 0	5 15 0	6 0 0	6 5 0	7 10 0	5·0
6·0	5 14 0	6 0 0	6 6 0	6 12 0	6 18 0	7 4 0	7 10 0	9 0 0	6·0
7·0	6 13 0	7 0 0	7 7 0	7 14 0	8 1 0	8 8 0	8 15 0	10 10 0	7·0
8·0	7 12 0	8 0 0	8 8 0	8 16 0	9 4 0	9 12 0	10 0 0	12 0 0	8·0
9·0	8 11 0	9 0 0	9 9 0	9 18 0	10 7 0	10 16 0	11 5 0	13 10 0	9·0
10·0	9 10 0	10 0 0	10 10 0	11 0 0	11 10 0	12 0 0	12 10 0	15 0 0	10·0
11·0	10 9 0	11 0 0	11 11 0	12 2 0	12 13 0	13 4 0	13 15 0	16 10 0	11·0
12·0	11 8 0	12 0 0	12 12 0	13 4 0	13 16 0	14 8 0	15 0 0	18 0 0	12·0
13·0	12 7 0	13 0 0	13 13 0	14 6 0	14 19 0	15 12 0	16 5 0	19 10 0	13·0
14·0	13 6 0	14 0 0	14 14 0	15 8 0	16 2 0	16 16 0	17 10 0	21 0 0	14·0
15·0	14 5 0	15 0 0	15 15 0	16 10 0	17 5 0	18 0 0	18 15 0	22 10 0	15·0
16·0	15 4 0	16 0 0	16 16 0	17 12 0	18 8 0	19 4 0	20 0 0	24 0 0	16·0
17·0	16 3 0	17 0 0	17 17 0	18 14 0	19 11 0	20 8 0	21 5 0	25 10 0	17·0
18 0	17 2 0	18 0 0	18 18 0	19 16 0	20 14 0	21 12 0	22 10 0	27 0 0	18·0
19·0	18 1 0	19 0 0	19 19 0	20 18 0	21 17 0	22 16 0	23 15 0	28 10 0	19·0
20·0	19 0 0	20 0 0	21 0 0	22 0 0	23 0 0	24 0 0	25 0 0	30 0 0	20·0

THE WEEDS OF QUEENSLAND.

BY C. T. WHITE, Government Botanist.

No. 34.

A "RATTLE POD" (*CROTALARIA STRIATA*).

Description.—A woody erect branching undershrub of 2-4 ft. high, the young branches densely silky hairy. Leaves trifoliolate (composed of three leaflets), petiole (leaf-stalk) 1-2 in. long, leaves obovate or obovate-oblong, the central one the largest 1½-2½ in. long, ¾-1½ in. broad, all on petiolules (stalklets) of 1 line. Flowers in long terminal racemes of 6 in. to over 1 ft. according to the stage of development. Bracts subtending the flowers hairy, linear-setaceous, 2-3 lines long, very deciduous. Pedicels (flower stalks) 1-1½ lines long, covered with rather long silky hairs. Calyx about 3 lines long, densely silky hairy, the lobes lanceolate, acuminate equalling or the lower lobes slightly exceeding the tube. Corolla yellow streaked with dark lines, about ½ in. long. Pod 1½ in. long, ¼ in. broad, cylindrical with a deep central furrow when ripe; seeds varying from a light straw colour to a deep brown, kidney-shaped, about 1 line long and 30-40 seeds in a pod.

Distribution.—A common weed over most of the tropics; a native of Tropical Asia, Africa, and America, but no doubt introduced into Australia and the Pacific.

Common Name.—This and other members of the genus go under the name of "Rattle Pod," due to the dried pods with their seeds making a rattling noise when shaken.

Botanical Name.—*Crotalaria*, from the Greek *krotalon*, a rattle, in reference to the rattling noise made by the seeds in the dry pod when ripe; *striata* (Latin) meaning fluted.

Poisonous Properties.—This plant has several times been suspected in Queensland of causing losses amongst stock and the genus is a dangerous one containing, in other parts of the world, plants known definitely to be poisonous to stock—*e.g.*, *C. Burkeana* (Stiffzeikte bosje) in South Africa and *C. sagittalis* (Rattle Box) in North America. In the "Report of the Administrator of the Northern Territory" for the year 1922, Pt. XIV., pp. 133-134, the Chief Veterinary Officer, Mr. J. C. Lewis, gives some results of feeding tests carried out with this plant.* He states—"From time to time numerous deaths occur among the herds of goats, particularly the younger animals, due to their eating portions of either ironwood or the indigo plant, but it rarely happens that the fatalities are among the older goats, or that any number become poisoned at or about the same time, for the harmful nature of the plants is probably early recognised by the animals.

Where many deaths occur at or about the same time it can generally be taken that, if not due to an infectious disease, the animals have suddenly had access to a poisonous plant not previously encountered. Instances, however, do occur where perverted appetite or a desire for a change leads an animal to sample some poisonous bush, and the example is soon followed by others.

This is probably the explanation of the outbreaks of poisoning seen among herds of goats due to a plant which for years they have passed by, and for which a sudden fancy is developed. Nine goats among a herd at the Botanic Gardens died one night without showing any previous symptoms, having been shut up in good health the evening before. Examination at the post-mortem which I held next day, together with the history of the cases, pointed to a probability of vegetable poison being the cause of the fatalities, the suspicion being strengthened by the finding of varying amounts of leaves and pods of a certain plant in the rumen of all the goats examined.

The summary of feeding experiments carried out on five goats is as follows:—Two to three ounces of the fresh leaves in bolus form are sufficient to produce death within twenty-four hours, the longest period being twenty-three and a-half hours, the shortest about eight hours, when three ounces of leaves were used.

With smaller quantities symptoms are delayed, but not prolonged. The continued feeding of very small quantities have not been carried out for long periods, so that the effect cannot be stated.

* The species is referred to under the name of *Crotalaria arborea*, a name, however, I cannot trace in botanical literature. From the excellent plate (Plate XIV.) accompanying the article, however, there is no difficulty in determining the plant as the widely distributed *C. striata*. I am indebted to Mr. J. Legg, B.V.Sc., M.R.C.V.S., for the reference to Mr. Lewis's report.

Plate 61.—A "Rattle Pod." (*Crotalaria striata*). Poisonous to Stock.

It was considered that if the plant were eaten at all, owing to its highly toxic nature, much more than the amount sufficient to cause death would probably be ingested.

Symptoms are not at all well marked, especially when large quantities are eaten, the onset being rarely more than half an hour before death. A straggling gait is first noticed, disinterestedness in surroundings and then inability to stand. A comatose condition with widely dilate pupil precedes death, which takes place without struggling. Respiration ceases prior to cessation of the heart beats.

The post-mortem appearance of animals experimentally fed corresponded closely to those observed in the first goats examined with the exception that, if anything, those in experimental cases were not so severe, probably on account of the fact that much more of the plant was eaten by the goats not fed artificially. In the thorax the most noticeable lesion is a large quantity of pleuritic fluid, also an increased amount in the pericardial cavity. The lungs show numerous hæmorrhagic areas, particularly at the free margins.

The appearance of the heart is normal, apart from the prominent and engorged subepicardial capillaries.

With the abdominal organs, the noticeable condition is one of congestion, the liver being swollen and bleeding freely from the cut or torn surfaces. The kidneys seem to be enlarged and congested with points of hæmorrhage beneath the capsule.

Though some increase in the amount of peritoneal fluid may be present, ascites is not well marked.

On opening the rumen and removing the internal desquamated layer of the mucous membrane, large areas of the papillæ are seen of intense redness. These appeared to be more marked where quantities of the plant lay against the rumen wall. Speaking generally the greater the amount of Crotalaria the rumen contained the greater and more intense the lesions on the papillæ.

Microscopical examination of the organs revealed a well-marked congestion of the liver and kidneys. In the liver much of the lobular structure is lost by blood extravasation, while the vessels are enormously distended.

In the kidneys, the extravasations of blood are confined principally in the medullary portion of the gland. Vessels in this portion cut tranversely showed besides engorgement swelling and desquamation of the endothelium. The glomeruli vary little from the normal in appearance.

Taking the post-mortem appearances as a whole and the conditions revealed on microscopic examination, the lesions point clearly to the poison acting principally on the endothelium of the blood vessels. The poisonous principle of the Crotalaria, though not isolated, can thus be put down as an endothelial poison.

The poisonous quality is lost when the plant is cut and dried. This was particularly noticeable during the feeding experiments. Though the plant was cut at flowering period, unless within a few hours after cutting, no results could be obtained from the administration of the leaves in bolus form.

Economic Uses.—The bark like that of other members of the genus contains a strong fibre, but it is not likely that under Australian conditions it will prove of commercial value. The plant is widely grown in the tropics as a green manure and as a cover crop for smothering weeds. In this latter respect Messrs. Kelway Bamber and J. A. Holmes, writing in the "Circulars and Agricultural Journal of the Royal Botanic Gardens, Ceylon," vol. v. No. 17, state—"The plant is very common in Ceylon from sea-level to 4,000 ft. Several experiments have been made both growing it alone and in various crops. It yields heavily and when grown alone has given 14¼ tons of stalk and leaf and 5¾ tons of root residue per acre in one cutting. If cut before flowering and not too low it will give up to four cuttings in a season, provided good growing weather is experienced. Planted in an acre of tea in alternate lines the total yield obtained in three cuttings for mulching purposes was 20,827 lb.

In the same Journal. vol. 3, No. 12, Herbert Wright, writing on green manures, states that analysis shows the plant to contain 0.73 to 0.991 per cent. of free nitrogen in the fresh state, and 3.8 per cent. in the dried material. This means that a green crop, 1 ton in weight, contains about 20 lb. of nitrogen. In summing up the advantages and disadvantages on Crotalaria and comparing them with those of cowpeas he recommends *Crotalaria striata* as the more suitable plant for tea owing to its upright habit and the stems not twining round the tea bushes, but favours cowpeas for cocoa and coconuts. For general use in Australia the plant, as a green manure, would probably find its greatest use in improving some of our poor sandy coastal lands.

Botanical Reference.—*Crotalaria striàta* De Candolle Prodromus, 2, 131.

COTTON CULTIVATION IN QUEENSLAND.

By W. G. WELLS, Cotton Specialist.

Ever since 1858 there have been spasmodic attempts to develop a cotton-growing industry in Australia, and particularly in Queensland, but with the exception of a short period when a total area of 14,000 acres was developed in about 1870, it cannot be said that the industry has flourished to any marked degree until within the last few years.

In 1919, owing to the growing scarcity of cotton, the Government of Queensland determined to make an extreme effort to put the cotton-growing industry in this State on a permanent basis and in order to accomplish this aim guaranteed to the growers a price of 5½d. per lb. for all seed cotton of good quality.

This guarantee has greatly stimulated the development of the cotton-growing industry, as is shown in the following table of acreages since 1913:—

—	Acreage.	Yield of Seed Cotton (lbs.)	Net Returns paid to Farmers per lb.	Total Value of Crop.
			d.	£
Queensland cotton 1914 ..	134	20,336	1·13	209
,, ,, 1915 ..	72	12,238	2·537	128
,, ,, 1916 ..	75	24,264	2·537	253
,, ,, 1917 ..	133	118,229	3·58	1,764
,, ,, 1918 ..	203	166,458	4·35	3,017
,, ,, 1919 ..	73	37,238	5·5	853
,, ,, 1920 ..	166	57,065	5·5	1,308
,, ,, 1921 ..	1,967	940,125	5·5	21,544
,, ,, 1922 ..	7,000	3,876,677	5·5	88,466

On 4th September the amount of seed cotton received at the ginneries amounted to 11,300,000 lb., of a value to the growers of £253,000.

ADVANTAGES OF COTTON GROWING.

The cotton-growers of the last two seasons have found that cotton-growing in most of the districts of Queensland is a valuable asset to the dairying or maize-growing industries.

Valuable Asset.

Not only is growing cotton a valuable asset in seasons of favourable climatic conditions, but also owing to the ability to withstand moderately droughty conditions it is of great assistance as a revenue producer in periods of drought unfavourable to producing profitable crops of maize or other farm products.

Grow Five to Ten Acres.

The experiences of many farmers who have attempted cotton-growing in conjunction with either of these industries indicate that the average farmer can easily grow from 5 to 10 acres of cotton without employing any extra labour, with the possible exception of short periods during the picking season.

Net Profits per Acre.

Men with medium-sized families have found that they could do all of the labour in connection with the growing of 5 to 10 acres of cotton, and for the results of their efforts received practically net returns of from £20 to £40 per acre and in several cases even higher results.

Children can Pick.

Owing to the period of cotton picking occurring during the cooler seasons it is no hardship for the children to assist in the picking on holidays and after school hours, and thereby earn their spending money or assist in increasing the family's resources.

Limit your Acreage and Grow Good Cotton.

It is not considered advisable for the growers to attempt larger acreages than 10 to 15 acres until they become more familiar with the operations connected with cotton-growing. It is far better for the future of the cotton-growing industry of Queensland if the acreage under production each year is limited to only what will produce the highest quality and grade of cotton, rather than to have a big expansion of the acreage which will mean the production of cotton of mediocre or inferior quality and grade.

THE NECESSITY FOR PURE STRAINS OF VARIETIES OF COTTON.

Pure Varieties being Bred.

The Department of Agriculture and Stock realises the necessity of developing the cotton-growing industry on lines based on the production of only the highest quality of uniform pure varieties of cotton of the types which are in demand by the fine spinners of the world. Pure

varieties of these types have been introduced from the United States, and experiment stations are being developed where these varieties can be carefully selected and bred to suit the requirements of the various sections of the cotton-growing districts.

Community Cotton.

The experiences of the other cotton-growing countries of the world, particularly in Egypt and in the United States, show the absolute necessity of placing a cotton-growing industry on a one or "community" variety basis. This is not only of advantage in maintaining the purity of any cottons which may be found the most suitable to the various climatic and soil conditions of a country, but is also of marked assistance in the marketing of the crop to its fullest value.

Advantages of One Type.

Localities which grow only the one type of uniform cotton year after year soon become known to the cotton trade for their reliability of types, and the buyers are willing to even pay premiums over the average market in order to secure such uniform cottons.

SOILS.

Plenty of Suitable Land.

There are many types of soil in Queensland which appear to be suitable to cotton-growing, even under severely droughty conditions, and under normal seasonal conditions there are probably sufficient acreages to meet the expansion of the cotton-growing industry until it reaches a state of development which will require a population very much in excess of that of Queensland at present.

Undesirable features may be discovered in some of these soils after they have been cropped to cotton for several years; but, for the present, the following soils seem to be well suited to cotton-growing:—

Southern District.

Alluvial creek deposits, sandy loams, apple-tree flats (especially in the South-Western districts), light loams of a foot or 2 feet in depth overlying heavy subsoils (particularly along the coastal area), and the heavy brown loams between the sea and the main range (Toowoomba).

Central District.

The alluvial creek deposits in this district have been found to produce very good yields of good quality cotton of the length and type of staple of which there is the most scarcity. Fortunately, there are large acreages of these soils in this district, and eventually there should be a considerable amount of fine cotton grown in this section. The soft-wood scrub red and grey soils have also produced excellent crops of good quality. In years of good winter rainfall with opportune spring rains

the heavy black soils may be expected to produce heavy yields of cotton, but it is pointed out that the difficulties of obtaining a stand under droughty conditions are more numerous than in the softer soils.

Northern District.

There has not been sufficient cotton grown in the Northern District to thoroughly demonstrate the possibilities of that section. In sections of medium rainfall the sandy loams of the river flats have produced very good staples and over a series of years would probably produce better cotton than the heavy or hilly soils. In the heavy rainy belts it is deemed advisable to experiment with the open and lighter soils in order to check too rank a growth of the plant.

Fertile Soils Advisable.

With the exception of the districts receiving high amounts of rainfall during the growing season, it is advisable to grow cotton on the more fertile soils. The poorer soils may produce cotton in fairly large quantities per acre, but cotton on such soils is more subject to the influences of the climatic changes and may not be of the same constant quality over a series of years as the cotton grown on the richer soils.

This is a very important point, as the spinner is looking for a continuity of supply of the one type of cotton in order that he can feel assured of securing the same type of cotton year after year.

PREPARATION OF SEED BED.

Thorough Prepared Seed Bed Necessary.

The experiences of the cotton-growers of this season (1922-23) under the conditions of severe drought which have existed clearly indicate the necessity of thoroughly preparing the seed bed before planting. In nearly every district the application of modern methods of dry farming have secured results which show that, even under conditions of very severe drought, good yields of cotton may be obtained if the proper methods of farming are utilised.

Early Preparation Advisable.

A large percentage of the development of the cotton industry is taking place in the newer sections of the country and much of the acreage devoted to cotton-growing is of soil being broken for the first time. Consequently, it is of the utmost importance to establish the best of tilth on such soils before planting a crop. Early ploughing after the rainy season, followed by sufficient harrowings to destroy the growths of weeds and conserve moisture, with a cross ploughing of a depth of 6 to 7 inches at least six weeks before planting, should be the rule for new land throughout most of the Southern and Central districts of Queensland.

Ploughing of Grass Sod.

It appears desirable to plough somewhat shallow in grass-sod land, as this allows the roots to be exposed on the surface during the dry winter months, which is of assistance in killing and decomposing them. By thoroughly harrowing such sod before the latter cross ploughing, the upper surface is reduced sufficiently to allow the preparation of a

PLATE I.—SHOWING THE DEVELOPMENT OF THE ROOT SYSTEM OF A COTTON PLANT.

A. Grown on a poorly-prepared seed bed.

B. Grown on a well-prepared seed bed.

firm, mellow seed bed after the cross ploughing has been done. Winter rains should always be followed by a good harrowing to conserve the moisture. It is believed that seed beds prepared under such methods will have sufficient moisture under normal conditions to insure the development of the young seedlings after they have become established.

Removal of Old Stalks.

In preparing the seed bed following a crop of cotton the problem presents itself as to how to remove the old cotton stalks. Some method of ploughing out the whole stalk is advisable, as the field can then be

raked and burned, thereby destroying all trash and also any remaining seed cotton—an important item in preserving the purity of the new crop. This would also assist in destroying any bacterial or fungoid diseases and any insect pests which may be in the unopened top crop of bolls at the time of ploughing, especially in districts where frosts do not occur.

It is pointed out that if the stalks are ploughed under the above advantages are lost, and also owing to the lack of general winter rains the seed bed will not be able to settle firmly, thereby increasing the difficulties of securing a moist seed bed which will carry the young plant over the dry periods of the spring months.

TIME TO PLANT.

Early Planting.

When to plant has been the subject of much discussion this last season, but from the results secured and from the experiences of the cotton-growers in the United States, it appears desirable to plant as soon as there is sufficient moisture and warmth in the soil to ensure a rapid germination and development of the seedlings. It is pointed out, though, that the time of planting should not be so early as to subject the young plants to cold night temperatures, as such conditions, while the plants might not be subjected to frosts, are conducive to checking the development of the young plants, in which case such diseases as "sore-shin" or "damping off" often occur with a resulting mortality in the ultimate "stand" secured.

September and October.

In most of the sections of Southern and Central Queensland the proper conditions for planting will probably occur in September and October. The temperatures are not very high at that season of the year and the evaporation of the soil moisture is therefore small, so that in a well-prepared seed bed with a moist subsoil and surface soil a light rain will establish sufficient moisture to germinate the seed. This is generally before the summer grass seedlings sprout, which enables the young cotton plants to become thoroughly established and also allows the grower to prepare a good surface mulch as soon as the rows of young plants can be seen.

Exceptions to Early Planting.

There are sections in the Coastal and in the Northern Districts especially where it may not be advisable to plant in the early months, as the first bolls of such crops might open in the rainy period, in which case there is a probability that the grade of the lint cotton might be lowered and in some cases part of the crop destroyed. In similar sections in the Southern and Central Districts it may be advisable to delay the time of planting until the first part of November, which should delay the opening of the crop until after the rainy season. There is danger, though, at this time of the year, of the young seedlings being "burnt off"

by severe hot winds, especially if the seed has been planted too deeply so as to delay the appearance of the young leaves above the ground, or if there is insufficient moisture in the upper surface of the seed bed.

Planting in Northern Districts.

There is no clear evidence as when to plant in the Northern districts. Some growers advocate planting in late December just before the heavy rains start, while others advocate waiting until the rains are nearly over before planting. The disadvantage of planting in December is that continuous wet weather may set in before the crops are properly cultivated, in which case difficulty might be experienced in coping with the weeds. The plants would have a tendency to grow very rankly and possibly at the expense of the development of the crop. On the other hand, the growers waiting until the rains are nearly over may experience the difficulty of being delayed in their planting until the season is so far advanced that the plants are delayed in the ripening of the crop of bolls by the cool night temperatures. Carefully conducted experiments are necessary to determine the proper time of planting in such districts, and the Department is at present investigating the points in question.

Dry Planting.

Some growers in the Southern Districts this season have secured very good results by getting their seed bed in good condition and then planting it in the dry dirt—their idea being that they would thus be able to obtain the advantage of any light local showers supplying sufficient moisture in the upper surface to ensure germination of the seed. The danger of this practice is that the germination of the seed may be delayed, through lack of rains, to such an extent that the weeds and grass may get so far advanced that the young seedlings will be choked out when they attempt to come through the surface soil.

Methods of Good Farming are Necessary.

It is brought out at this point, that unless the grower is going to apply the best methods of farming in growing his crop of cotton, that he need not expect to receive highly profitable crops. It is true that under very favourable soil and climatic conditions some of the growers of two years ago received very large yields from crops which had been badly neglected by the growers leaving them from the time of planting to the time of harvesting. These results gave rise to the opinion that cotton could be grown under very poor methods of farming, but the growers who have tried such methods under the droughty conditions which have existed this year, have been sadly disillusioned, and now thoroughly realise that the best methods of farming are absolutely essential in the production of a profitable crop of good quality cotton.

There are many qualities of lint which may be in a well-opened boll of cotton. Because the crop has large well-opened bolls is no criterion that the quality will be the best. The methods of farming determine the

quality, and the distances between Australia and her world markets for cotton demand that the methods of farming be such as to produce only the best qualities.

HOW TO PLANT.

Necessity for an even Germination.

Many methods of planting have been devised this year, all of which have succeeded under the proper soil and moisture conditions. All of these methods are open to criticism in that they do not ensure an even depth of planting; and in many cases in this season, in parts of the row, the seed has been planted too shallow or too deeply, resulting in an uneven germination which has handicapped the grower in that the planted rows were not sufficiently defined, when the plants were in the seedling stage, to allow an early cultivation being made. This is a very important factor—the securing of an even germination, and the grower should exercise care in getting the seed planted at the same depth, the proper depth being 2 inches in moist soils. Any serious delay in cultivating the early crop often allows the weed growth to check the development of the young plant, or necessitates the incurring of considerable expense in employing hand labour. This is especially true in regard to late planted crops. An uneven germination is also a handicap at thinning time, as the plants being of different heights and stages of development will not all be thinned at the proper stage.

Furrow Planting.

Many of the growers of this past season who have been growing their first crop of cotton did not feel warranted in incurring the expense of purchasing a cotton planter, and planted their crops by ploughing out shallow furrows, dropping the seed by hand, and then covering the seed with a drag harrow. This method has often given very good results, but it is pointed out that a well-prepared seed bed should first be established well in advance of the planting time before using this system, and that small acreages have given the best results.

Dangers of Furrow Planting.

This is somewhat of an expensive system unless the regularly employed labour can be utilised, and there is also the danger of the soil drying out too quickly before the seeds are covered. It is suggested where this system is employed that the seed be dropped and covered immediately behind the furrowing plough so as to reduce the loss of moisture.

Soaking Planting Seed.

It may be advantageous to soak the seed in warm water for several hours before planting by this system as this would hasten the germination. It is necessary, though, not to have the water sufficiently hot to destroy the germ, or, to delay the planting after soaking the seed. It is not believed advisable to plant soaked seed in dry ground, as the seedlings will sprout and then die before making contact with the lower moistures sufficiently to enable them to come through the surface.

Methods of Treating Seed for Planting.

Unfortunately, in this country, most of the machinery for planting maize is not supplied with attachments suitable for planting cotton seed as it is received from the gin. The short fuzz which adheres to the seed interferes with an even distribution, and it has been found necessary to prepare the seed so as to enable it to distribute more freely. This has been accomplished in several different ways. Puddled clay or a very thin flour paste is often used, the seed being dipped into the mixture and then rolled to ensure even distribution of the coating. The rolling may be accomplished by putting the treated seed in a hessian sack and rolling the seed from one end of the sack to the other until smooth. The seed should be dried quickly in the sun. When rolling the seed which has been dipped into the flour paste, it is advisable to put some wood ashes in the sack in order to ensure thorough separation of the seed.

Singeing.

The fluff on the seed may be singed by passing the seed through a hollow burning log into a tub of water. The seed should be removed immediately from the water and dried in order to prevent the soaking of the seed, which is undesirable when using a machine to plant as the seed may be cracked in passing through the seed plates.

Dangers of these Methods.

The danger of all these methods is that the coating applied to the seed may be too hard to allow the young seed leaves to expand when they are through the ground, which would stop the growth of the young plant. Several instances were noticed of this occurring this past season, and it is pointed out that the coating should be only as thick as is necessary to accomplish the desired effect on the seed.

Several implement firms are investigating the possibilities of securing machines suitable for either cotton or maize planting, and it is anticipated that reliable makes of machines will soon be on the market. These will be of great assistance to the growers in quickly planting their acreage after any spring rains—an important point in seasons of light showers.

Rate of Planting.

During the past season 10 lb. of seed to the acre has been the recommended rate of sowing, but from the results secured it appears advisable to increase the rate to at least 15 lb. to the acre. In the United States, after years of experience and experimenting, it is the custom to plant 20 lb. to the acre, and many authorities advocate even more.

A Good Stand is Necessary.

Plenty of seed in a properly prepared moist seed bed is the cheapest form of insurance of securing a good stand. Without a good stand the grower is handicapped in obtaining the maiximum yields which his soils are capable of producing, no matter how carefully he may grow the crop.

Good Seed Available.

Only the seed from the districts which received the best rainfalls is being reserved for planting purposes. Numerous germination tests have been made to ascertain the percentage of germination, and it is believed that the best seed available is being distributed. However, as an extra precaution the rate of sowing should be somewhat liberal.

SCRUB PLANTING.

The consensus of opinion of the growers who have had experience in planting in the burnt-off scrub lands, is that the hand maize planter gives the best results. Treated seed is used, and the average machine drops four to six seed per hill. When spacing the hills about 2 feet apart in the row and 5 feet between the rows, a man is capable of planting 3½ to 4 acres per day.

SPACING BETWEEN ROWS.

No Fixed Rule.

The distance between the rows is a problem of which there is not sufficient evidence to arrive at a definite decision. Different soils and climatic conditions require different spacings of the rows and the plants in the rows. A spacing which may give the best results in one season may not do nearly as well in another season of a different rainfall, even on the same piece of land. For this reason, no definite rules of distances of spacing should be made. It is strongly urged that the grower experiment on his own soils and be guided by the results secured. It is pointed out, though, that such data as the uniformity and percentage of the stand, dates of planting, &c., should be accurately collected before arriving at any definite decisions, as any discrepancies in such data may influence the arrival at inaccurate conclusions.

Rich Alluvial Soils of Coastal Belts.

As a general rule, it is believed that for the rich alluvial soils in the coastal belts, plenty of distance should be allowed between the rows, and most growers agree that distances of 4½ to 5 feet are preferable. These distances may appear somewhat wide under droughty conditions such as occurred in this last season, but under such a variable climate as of the coastal belt of Queensland, it is necessary to allow for the rainy seasons when such wide distances will be required.

Dangers of Over-growth.

Most of the alluvial soils are very fertile, and under a season of good rains, the plants show a tendency to make a rank growth. Unless the rows are of sufficient distance apart to allow the sunlight to penetrate to the lower sections of the plants, there is danger that the lower bolls may rot from fungoid diseases caused by the excessive shade and conditions of humidity.

Alluvial Soils in Drier Belts.

In the districts away from the coast, a distance of 4 feet between the rows may be of sufficient width, although on the alluvial creek flats it may be wiser to allow 4½ feet.

Minimum Spacing of Rows.

It is not recommended that the rows be spaced less than 4 feet apart, as it may be advisable to cultivate between the rows late in the season, if the weed or grass growth is excessive, in which case matured plants in rows less than 4 feet apart might be developed to such an extent as to preclude a possibility of a horse being worked in the cotton without doing severe damage to the branches.

Picking Difficulties.

In seasons of excessive rainfall, there would probably be some difficulty experienced by the pickers in progressing through rows spaced less than 4 feet apart. In the season of 1921-22 several instances were reported of the plants interlapping to such an extent that it was difficult to ascertain from a distance the direction of the rows.

Scrub Lands.

Widths of 4½ to 5 feet between the rows has been the general custom in planting in the scrub lands.

PROPER TIME FOR THINNING.

Early Thinning.

The results secured by the growers this past season seem to indicate that the early planted cotton should be thinned when the plants are about 6 to 7 inches tall. The plants are well established then if growing in well prepared, moist seed beds, and by "chopping" to the desired stand the plants are allowed to develop into a thick stalked blocky type with a good rooting system, which is conducive to the early formation of fruiting branches.

Results of Late Thinning.

Many of the growers of this past year delayed the thinning until the plants were 12 to 14 inches tall, with the result that a slender whip-like type of plant was produced which failed to produce a lower crop of bolls. By delaying the thinning not only did the lower crop of bolls fail to develop, but the supply of soil moisture was also seriously diminished, and in some instances to such an extent that the development of the plants remaining, after the thinning, was greatly retarded and in some cases with severe results owing to the lack of rainfall at critical periods. This is of the utmost importance, as it is highly desirable that the young plant receive every assistance in becoming thoroughly established in the lower soils before the arrival of the period of hot temperatures, prior to the usual rainy season.

Thinning Late Planted Crops.

It may be advisable to delay the thinning until the plants are somewhat taller in the case of late planted crops, which will arrive at the time of thinning just prior to the usual time of the occurrence of the rainy season. Late planted cotton has the tendency to grow very rapidly under conditions of excessive moisture, and it is possible that by

delaying the thinning until the plants are about 10 inches tall that the growth will be restricted somewhat, and, after thinning, the plants will set a crop more quickly than is the case of an early thinned, rank-growing plant. There is no real evidence on the subject in this country, although it has been found to be somewhat true in the United States. It is advisable that the growers experiment with both methods where it is necessary to plant in the latter part of November or in December.

Time the Thinning Operations Properly.

Judgment should be exercised as to when to commence the thinning operations. If the available labour is such that the field can be completed within a week, it is advisable to wait until the plants are of the proper height for thinning. If the proper amount of labour cannot be obtained, it is advisable to start when the plants are from 5 to 6 inches in height in order that the plants will not be too tall and slender when the chopping is completed. A few days' wages paid to a man at this stage may mean a saving of considerable importance later, for not only are the cotton plants growing, but the weeds and grass may be also, and thereby be sapping the young cotton plants.

HOW TO THIN.

Use the Hoe.

Many of the growers of the past season have been of the opinion that the thinning should be done by hand. This is a very expensive, tedious, back-breaking operation and not at all necessary. With a well-balanced sharp hoe of about 7 inches in width, unless the soil is very foul with weeds and grass, or the plants allowed to grow too tall, a man can chop out an acre of cotton a day.

Advantages of Hoe Thinning.

This is not only less expensive than thinning by hand, but it is also more desirable, as two operations are performed at once—the young cotton plants which are not required are removed without disturbing the lower soils around the roots of the remaining plants, and the weed and grass seedlings are also removed. Both of these points are important, as the disturbing of the lower soils and quite often the root systems themselves, by hand thinning, allows the moisture to evaporate at a period in the development of the young plant when all available moisture should be conserved, and the destroying of the weed and grass seedlings allows the young cotton plants to develop without restriction.

Leave Healthy Plants.

Care should be exercised in leaving only healthy, normal plants whenever possible. It will be noticed upon examination, that often the cotton plant loses its main stalk when quite small, and two branches are developed from near the bottom to take its place, giving the plant a forked appearance. This type should not be left if possible of avoidance, as it has the tendency to develop a large bushy habit of growth at the expense of the lower fruiting branches, which reduces the amount of the lower crop of bolls.

Sharpen the Hoe.

In chopping with a hoe, the edge should be kept sharp, as it ensures a clean cutting off of the plant and also reduces the amount of effort necessary to accomplish the work.

Chop Close to the Ground.

Care should be exercised to cut the plant off at the surface of the ground in order to be below the pair of seed leaves—the first leaves to appear. By chopping the plant off below these leaves the plant will be killed, whereas by cutting above the seed leaves the plant will develop into the undesirable forked type.

DISTANCE TO THIN.

Determining Factors.

There are no reliable data as regards the proper distances to thin cotton in Queensland. As in the spacing of the rows, the different soil and climatic conditions are the governing factors. The determination of a distance which will give the best results under the most variable conditions should be the aim of each grower, and it is strongly recommended that each grower experiment with different distances in order to learn the requirements of his particular soil or soils. A distance which may be suitable for one section of his field may be unsuited for securing the best yields in another section of the same field, so that it is necessary for each grower to know his soils in order to secure the most profitable yields.

Suggested Distances.

There are certain generalisations which may be made, though, based on the results secured by the growers this year. It appears highly important to allow ample distance between the plants, under droughty or semi-droughty conditions, in order to supply the maximum amount of available moisture. This distance will vary under different soil conditions, but for the inland districts with annual rainfalls of 30 inches or less, it is suggested that distances from 15 to 20 inches apart be tried until the grower has had sufficient opportunity to obtain results from definite experiments. In the coastal districts where the rainfall is somewhat more certain, and the soils are of sufficient fertility to necessitate spacing the rows 4½ to 5 feet apart, it may be advisable to reduce the distance between the plants to 12 or 15 inches, as, in normal seasons, the conditions will be favourable to producing well-fruited plants bearing cotton of good strength and length.

Only One Plant.

It is not recommended that more than one plant be left to the space. Many of the growers of this past season who planted their cotton in hills, left the plants unthinned, or, in some cases, two to the hill. Under the droughty conditions, competition for plant food and moisture checked the development of both plants with a consequent detrimental effect on the quality of the lint and the yield.

Check-row System.

Some of the growers of this season have planted their cotton on the check-row system—that is, on the square. The advantages claimed for this system of planting are that the expense of cultivation will be less, owing to it being possible to cultivate both ways with a machine and thus reduce the amount of hand labour, and the picking will be facilitated as it will be easier for the pickers to get to the lower bolls.

Dangers Thereof.

Owing to the droughty conditions of this season, there has been no opportunity afforded of studying this system as regards the growth of wide-spaced plants under conditions suitable for the development of luxuriant growths. It is pointed out, though, that there may be danger under conditions of heavy rainfall of very rank plants being developed, which may be severely damaged by heavy winds owing to the tendency of widely-spaced plants to develop large basal limbs. These limbs would also hinder the pickers in their progress between the rows.

Disadvantages Thereof.

This season the plants have been of such small stature in the blocks where this system has been used, that the yield has been reduced owing to the wide spacing between the hills, distances of 4 feet being the average spacing.

There may be some districts where this system of spacing is advisable, but for the average grower it is advised that the system of wide distances between the rows and from 15 to 20 inches between the plants be used for the bulk of the crop. It is recommended that each grower experiment with the cross-check system in order to demonstrate to his own satisfaction the merits of the two systems.

Difficulty of Securing Stand.

Greater difficulty is to be experienced in securing a perfect stand under this system owing to the necessity of planting in hills in order to get the plants on the square. Hill planting is not advised, on account of increasing the possibilities of damaging the stand by insect injury owing to the proximity of the plants during the seedling stage. The loss of a hill under such wide spacing places a heavy burden on the adjacent plants, whereas in the continuous drill system this injury, if occurring before thinning, may be overcome by leaving the next plants spaced closer together.

CULTIVATION.

Cultivate Frequently.

Thorough and frequent cultivation of the cotton plant is highly desirable, and under semi-droughty or droughty conditions, it is almost an absolute necessity if staple cotton of good quality is to be produced. Because the crop is free of weeds should not deter the grower from cultivating his field, as there are other factors to be taken into consideration. By frequent cultivation of the soil the evaporation of the soil

moisture is greatly reduced, the mechanical condition is improved, and the aeration effected by the cultivation is conducive to the "sweetening" of the soils of a "sour" nature, thereby improving the conditions favourable for the development of the plant.

Average Number in U.S.A.

In the United States, surveys have been made by the Department of Agriculture which have shown that the number of cultivations for whole districts average six, after the crop is planted; and it is believed that this number should at least be equalled, and preferably increased, by the cotton-growers of Queensland.

Time of First Cultivation.

The first cultivation should be made as soon as the rows of young plants are discernible. This is advisable as the surface soil is generally packed somewhat by the harrowing and planting operations, and the growth of the weed and grass seedlings, which may have developed during the period of the germination of the cotton seed, will be checked.

Cultivate after Thinning.

Another cultivation should be made immediately following the "chopping" (thinning) operations in order to loosen the soil and to work the loose dirt towards the row in order to establish a mulch around the plants. The establishing of the mulch around the plants is beneficial in that the evaporation of the moisture from the soil in between the plants in the row is checked, and the loose dirt also assists in retarding the development of the grass seedlings. The dirt should be worked towards the plants at each cultivation, and at the "laying by" of the crop (the last cultivation before the plants are too large) it is advisable to "hill up" the plants to a good degree, not only to reduce the evaporation and check the weed growth, but also to brace the plants and assist them in withstanding the effects of heavy winds.

Hilling Cotton.

This "laying by" can be accomplished with disc cultivators, one-row scarifiers with "hillers" on the outside shanks, riding cultivators with the hillers on the inside set to throw the soil in, or, if done carefully, by a light "turning" plough set very shallowly. Care should be exercised with all of these machines to not cut deeply enough to sever the surface roots.

Hilling Controls Weeds.

It was observed this season that the growers were not hilling the plants at an early stage of the plant's growth, but it is believed that after the "chipping" is completed, it is advisable to work the dirt to the plants a little higher at each cultivation. This is of decided advantage in assisting in controlling the weed growth, and, done properly, should greatly reduce the expense of weeding.

Plate II.—A Very Heavy Picking. A Severe Storm Would Cause Considerable Damage to the Crop.

Do not delay the cultivation after the thinning until that operation for the whole field is completed. It is better to have the cultivators throwing the soil to the plants not later than a day behind the thinning, and thereby greatly reduce the evaporation of the moisture in the row where the hoe has chopped.

PICKING.

Ideal Conditions.

The climatic conditions during most of the period of the year in which picking takes place in Queensland are nearly ideal for picking cotton of the very best grade. Practically no rain, very little wind to fluff out and dry the cotton, plenty of sunshine, only moderate amounts of dew, and no frost until late in the season. All are conducive to clean picking, and the growers should utilise these natural advantages to the utmost.

WHEN TO PICK.

Allow a Good Opening.

It is highly essential that only thoroughly matured cotton be sent to the gins, in order to obtain the best grade of lint, and this can best be assured by allowing a considerable number of bolls per plant to open before commencing the picking operations. Where a good opening of bolls is visible the crop is in a condition where the pickers are less liable to pick partially opened bolls of immature cotton, the cotton will be more uniform in strength and character, and the ginner can deliver a good sample of lint.

Family Picking.

Where the grower and his family are doing the picking the crop can be kept picked closer than when pickers are employed, although it is pointed out that less acreage can be handled where the picking is kept up with very closely, due to the amount of walking necessary to obtain the same amount of seed cotton that would be picked in a field of a heavily opened crop.

Contract Picking.

This point should be kept in mind by the grower, that it is necessary that the picker be able to pick good weights for the day in order that the price of picking can be kept to a reasonable basis and the picker at the same time obtain a living wage.

Amount per Day.

In a well-grown cotton with the proper amount of open bolls it is entirely feasible for the average picker of a short period of training to pick 100 lb. of seed cotton per day, and it is believed that as the industry becomes better established and the pickers more experienced that 150 lb. a day will be more nearly the average. Several pickers of little experience were reported to have picked from 150 to 160 lb. a day during this season, under conditions not conducive to picking large weights owing to the light bodied cotton of the droughty season.

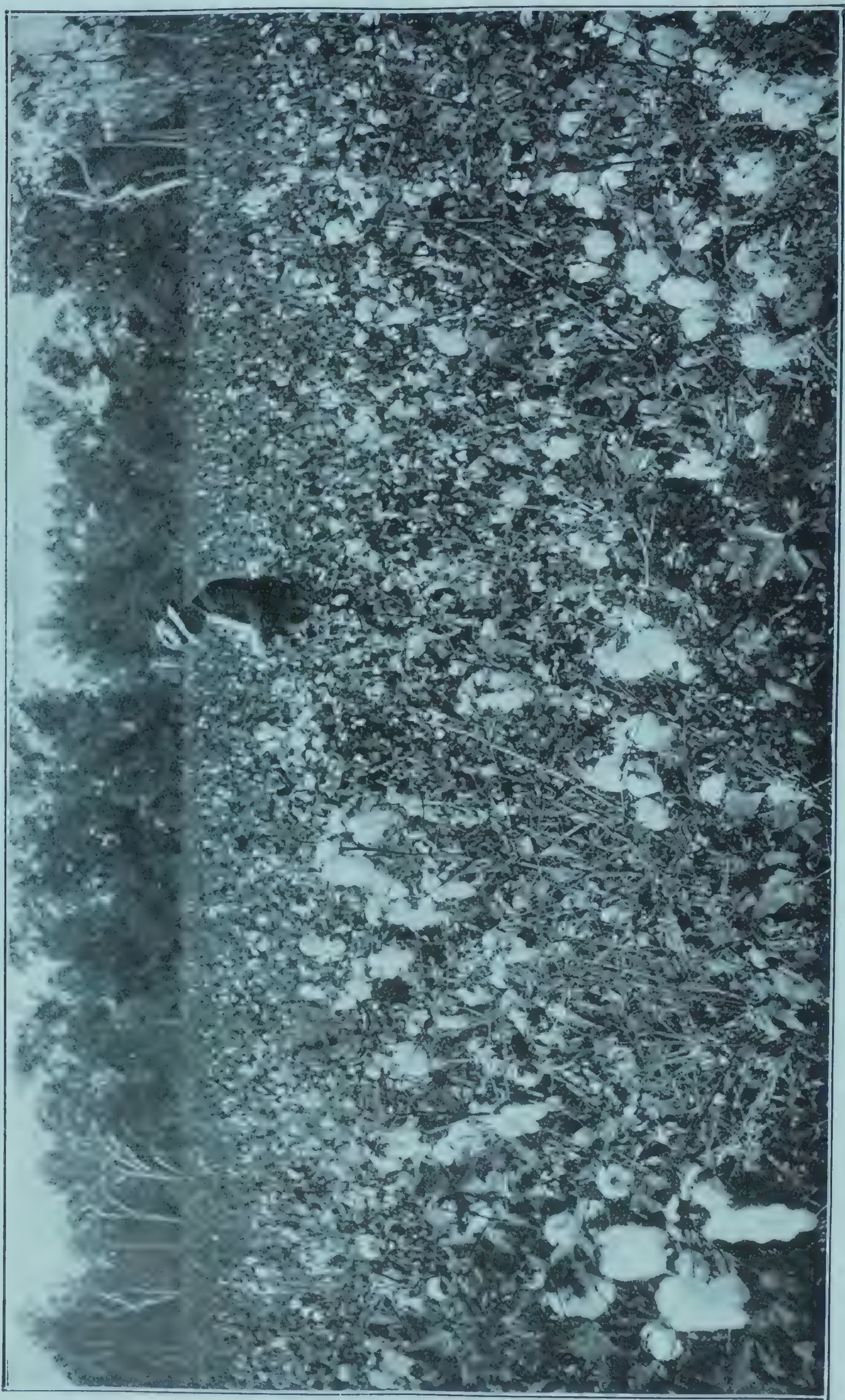


PLATE III.—A CROP OF COTTON BEYOND THE PROPER STAGE OF PICKING. NOTE THE STRAGGLY LOCKS HANGING OUT OF THE BOLLS.

Price of Picking.

The bulk of this season's crop of cotton has been satisfactorily picked at 1½d. per lb., and if the grower allows a proper amount of cotton to open before commencing picking, the pickers can make good wages, especially as they become more experienced and proficient.

PICKING RECEPTACLES.

Pick in Sacks.

The cotton pickers of the United States mostly use heavy duck sacks tied around the waist or suspended at the waist by a long strap hung over the shoulder. This sack is 24 to 30 inches wide and 7 to 8 feet long. This length of sack allows the weight of the cotton to rest on the ground without pulling on the picker's hips and also allows freedom of movement in bending over the plants. When the picking of one plant is completed the picker grabs the bag at the back of him with one hand and drags it along the ground to the next bush.

Drawbacks of Present Methods.

When the pickers in Queensland understand the construction and operation of these sacks, it is believed that the rate of picking per day will be increased over the present method of using chaff sacks and kerosene tins. Great loss of time is occasioned by the use of kerosene tins, with the necessary frequent emptying of them, and much inconvenience is encountered in the using of chaff or maize sacks tied around the waist.

NECESSITY FOR CLEAN PICKING.

Clean Cotton Required.

The demand of the cotton spinning industry of to-day is good, clean cotton, and the growers of Queensland should endeavour to forward only this grade of cotton to the ginneries. Freedom from leaf, grass, grass and weed seeds, immaturity, dirt, excessive stains, water or excessive moisture, disease and all foreign matters, is necessary in order to produce a high grade of lint.

Wet Cotton Objectionable.

Wet cotton should be particularly guarded against, as it is exceedingly difficult, even if the cotton is free of leaf or foreign matter, to gin a good sample of wet cotton on account of the fibres matting together when being ginned. This is very objectionable from the spinners' view point as such cotton contains a high percentage of waste.

Dry, Wet, or Damp Cotton.

There is no objection to picking cotton before the morning dew drys, but such cotton should be spread out in the sunlight on a clean wagon sheet or on the veranda, and stirred several times during the day to ensure proper drying.

Do not Delay Picking.

Grass and weed seeds are very difficult to remove from lint cotton, and the grower should endeavour to keep the fields free from such

PLATE IV.—DRYING DAMP COTTON PREPARATORY TO PACKING FOR FORWARDING TO THE GIN.

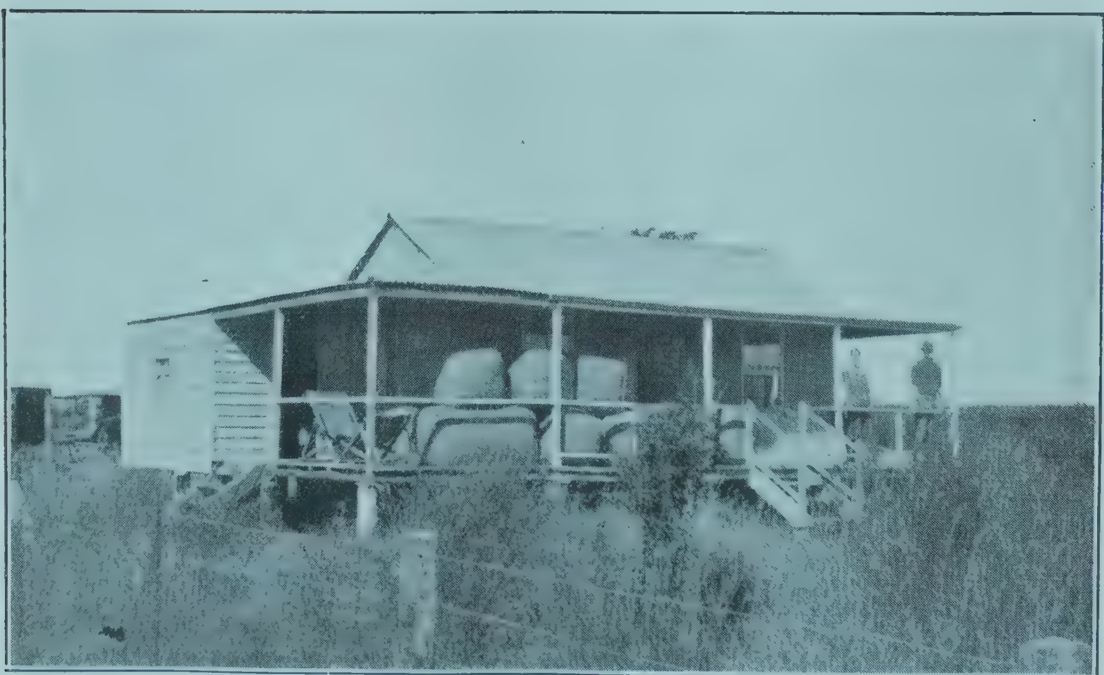


PLATE V.—DRYING COTTON AND WOOL-PACKS OF COTTON READY FOR THE GINNERY.

during the picking season. Cotton left in the boll until the winds blow it out straggly is often subject to this trouble, and the grower is cautioned not to allow his crop to remain unpicked for too long a period of time. Not only is this inadvisable on account of collecting foreign matter, but there is a danger of non-seasonable storms occuring, which cause a loss to the crop through part of it being beaten to the ground, or being stained; also cotton which is left for too long a period of time in the sunlight loses some of its bloom and character, with a consequent resulting loss in value.

Pick Good Cotton Only.

Particular care should be exercised to not pick the small, hard, unopened locks of cotton. The fibres in these locks are weak and of light body, and when mixed with good lint lower the value of the sample, as the weak, light bodied fibres are combed out in the mills as waste.

HOW TO FORWARD THE COTTON TO THE GINS.

Methods of Shipping.

The seed cotton can be shipped in second-hand wool packs and chaff or maize sacks. The grower's name and district should be written or stencilled on the sack. This is of assistance to the ginnery in checking the receipt of the sacks as they arrive, and also aids in the segregation of the various types of cotton preparatory to ginning.

Pack Only One Grade in a Sack.

Only cotton of one grade should be packed in a sack. The sacks are graded upon arrival and stored under different grades until ginned, and unless the growers co-operate by shipping only the one grade of cotton in a sack, much of the value of these operations will be lost.

Uniformity Required in the Lint.

For the purpose of the disposal of cotton lint after ginning it is important that each bale of lint should be of one grade only in order to obtain the maximum value of the different grades; and unless each sack of seed cotton, forwarded to the ginnery by the grower, is of the one grade it is impossible to place a uniform grade of lint in the finished bale.

Wool Packs Returned.

During this season the ginneries, upon receipt of shipments of cotton in wool packs, have returned an equal number of wool packs for a nominal sum to cover the cost of handling, freightage, &c. The chaff and maize sacks have not been exchanged.

NECESSITY FOR GRADING COTTON.

Not only is it necessary that only pure varieties of cotton be grown in Queensland but also that these cottons should be graded and ginned in such a manner as to entitle them to the highest prices.

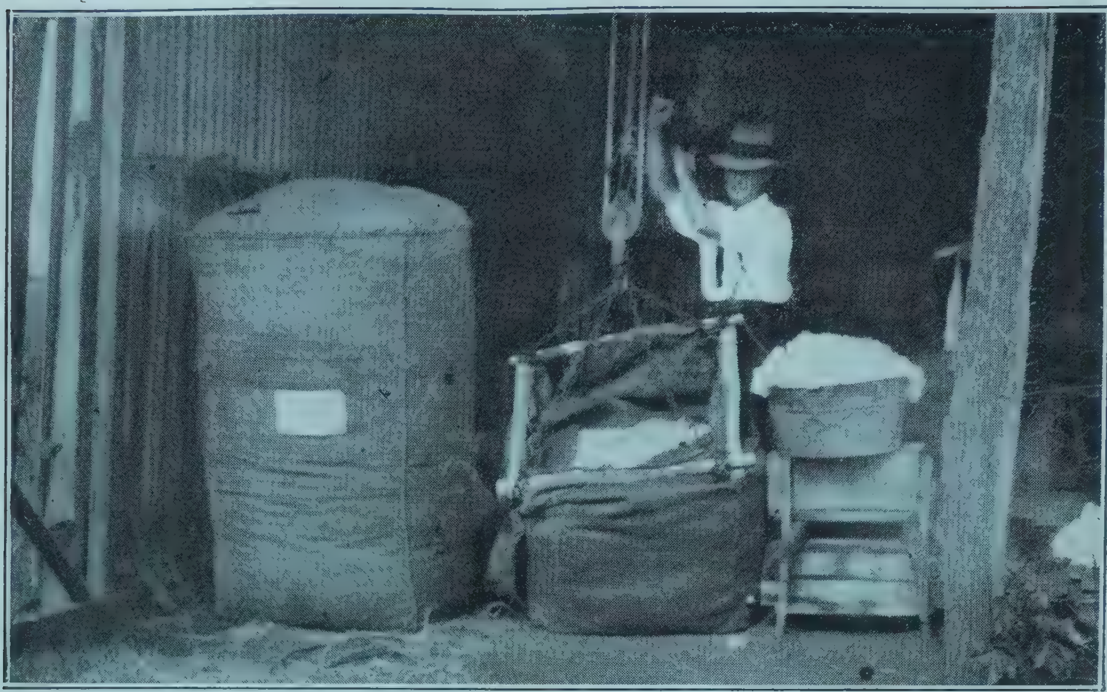


PLATE VI.—A GROWER'S APPARATUS FOR PACKING SEED COTTON IN A WOOL-PACK.

PLATE VII.—LOADS OF SEED COTTON ARRIVING AT THE RAILROAD FOR FORWARDING TO THE GINNERY.

All Cotton to be Classed and Graded.

In order to ensure that Queensland cotton will be prepared in this manner, the Department of Agriculture is securing an experienced cotton classer from England to supervise the classing, grading, and marketing of all cotton acquired by the Government.

TERMS OF THE GOVERNMENT GUARANTEE.

During 1923, the Department of Agriculture and Stock, through its agent, the British Australian Cotton Association, Limited, will supply cotton seed for planting purposes at a price of ½d. per lb., railage free.

Further, the Department will advance 5½d. per lb. for seed cotton of a length of staple of 1¼ inches, of good quality and free of all foreign matter and disease; and 5d. per lb. for seed cotton of a length of staple less than 1¼ inches, of good quality and free of all foreign matter and disease.

These prices will be paid for seed cotton delivered at the grower's nearest railway station prior to 31st July, 1924, the Government paying the railage to the nearest ginnery of the British Australian Cotton Association, Limited.

The raw cotton will be subsequently ginned and sold on owner's account, and, after paying the expenses, the surplus, if any, over and above the original 5d. or 5½d. per lb., as the case may be, will be paid to the supplier of the raw cotton.

Application for seed at the rate of 15 lb. per acre, accompanied by a cheque for the amount thereof at the rate of ½d. per lb., should be made direct to the Under Secretary, Department of Agriculture and Stock, Brisbane, or to the British Australian Cotton Association, Limited, Elizabeth street, Brisbane, or Rockhampton.

A price per pound of seed cotton will be advanced from the 1st August, 1924, to the 21st July, 1926, but this price and attendant conditions will be determined at a later date.

Advances after the 31st July, 1923, will only be made in connection with areas of cotton under 50 acres for any one man or company.

In all cases, the seed cotton must be delivered at the nearest railway station or port prior to the 31st July in each year.

The advances in all cases will only apply to cotton produced from seed supplied through the Department of Agriculture and Stock, and no cotton seed can be planted in Queensland excepting such seed as has been obtained through the Department of Agriculture and Stock or its especially appointed agents.

INDEX TO PLATES VIII. TO XII.

PLATE VIII.—Partially opened bolls showing immature seed cotton. Seed cotton of bolls in this condition should not be picked, as the fibres are not fully developed, being lacking in strength and body, and is still damp around the seeds, making it unsuitable for ginning. Such bolls are difficult to pick, and handicap the picker in securing a proper day's weight.

PLATE IX.—Well-developed bolls containing fully-matured cotton in the ideal stage for picking.

PLATE X.—Bolls in a condition past the proper stage for picking. (Note the leaf scattered over the strung-out locks of cotton.) A hard storm would cause severe loss in a crop at this stage.

PLATES XI. AND XII.—Bolls which have been injured by insect pests and then infected with one of the internal boll rots. Seed cotton of bolls in this condition should not be picked as the fibres are weak, immature, of a dark-brown or black colour, and would lower the value of the rest of the sample with which it was ginned.

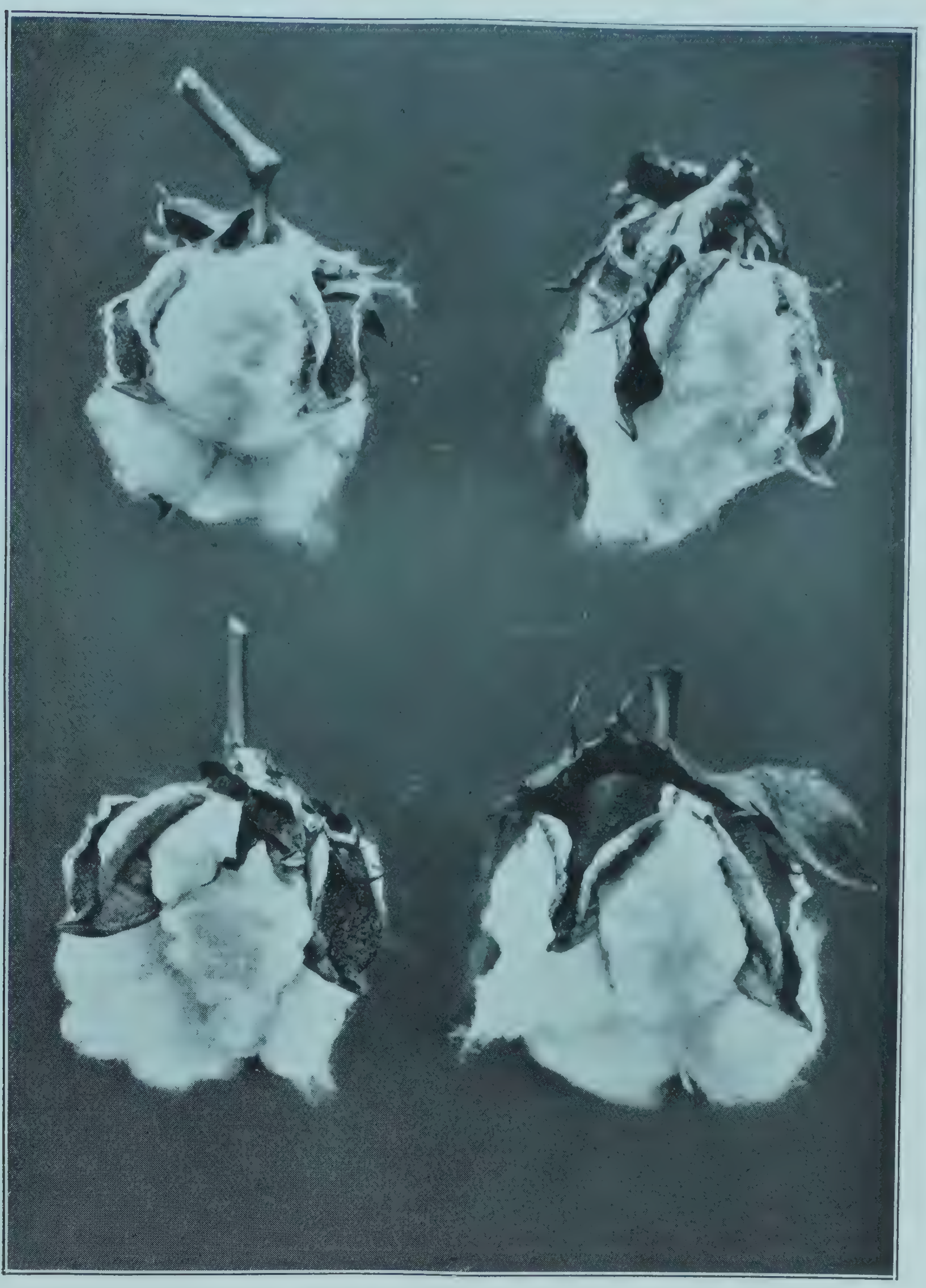


PLATE VIII.

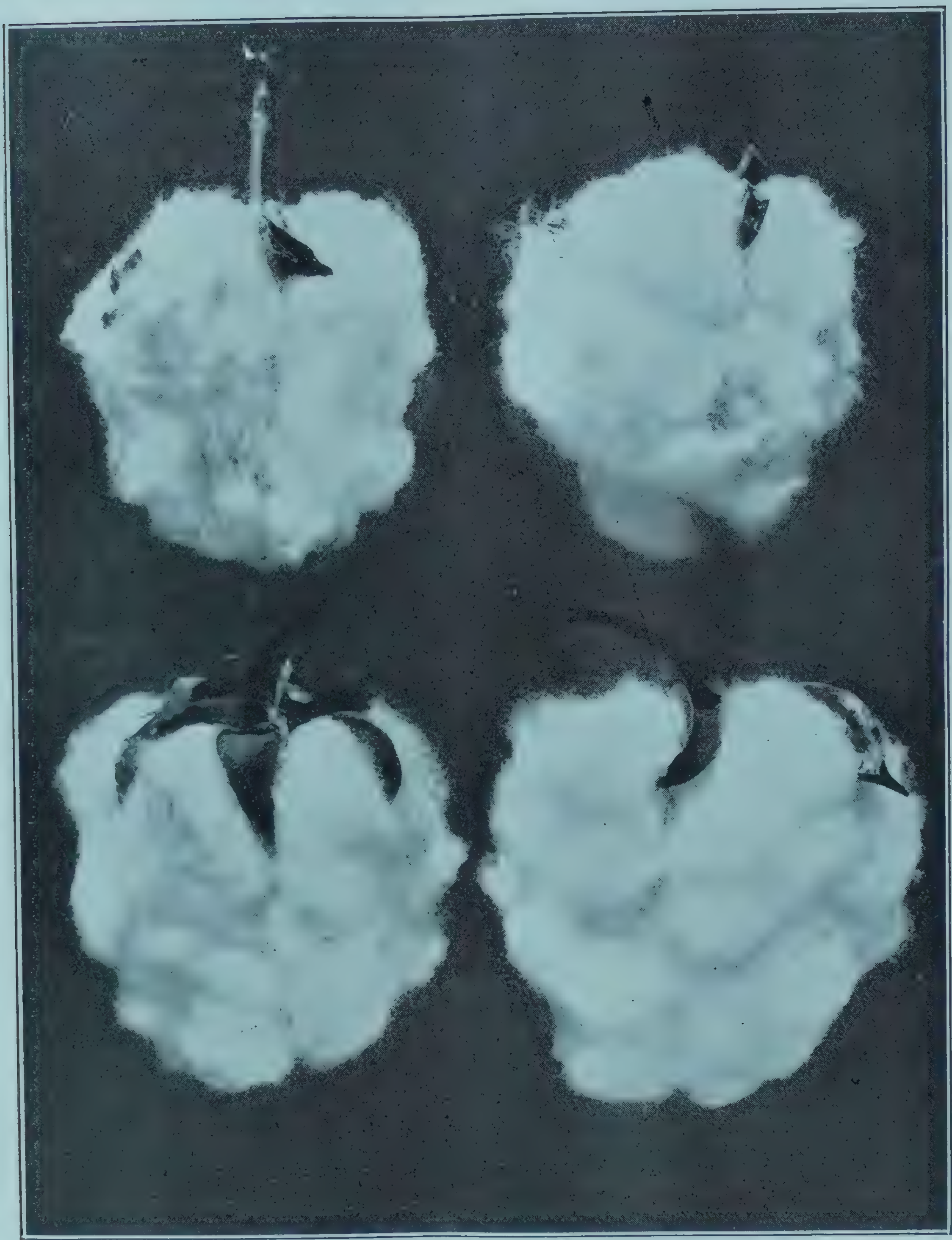


PLATE IX.

PLATE X.

PLATE XI.

PLATE XII.

THE QUEENSLAND COTTON INDUSTRY.

THE GOVERNMENT AND COTTON-GROWING ASSOCIATION—TERMS OF AGREEMENT—GINNING AND MARKETING.

The Minister for Agriculture (Hon. W. N. Gillies) has laid upon the table of the Legislative Assembly the papers appertaining to, and copies of, all agreements entered into by the Government with the British-Australian Cotton Growing Association in respect to the ginning and marketing of seed cotton grown in Queensland.

TERMS OF AGREEMENT.

A copy of an agreement dated 30th September, 1922, sets out that the company should, before 31st July, 1924, erect, equip, and complete in Queensland so many cotton-ginning factories as might from time to time during the period of the agreement be sufficient for treating all the seed cotton grown in Queensland during such period, and at least one cotton-seed oil mill for the treatment of surplus cotton seed. Every factory erected by the company should, unless otherwise approved by the Minister, continue proper railway facilities connected with the Queensland Government railways.

The company undertook to expend at least £150,000 in the erection, equipment, and completion, before 31st July, 1924, of ginning factories and oil mills in Queensland.

The Government should pay the company 1¼d. per lb. for lint ginned, pressed, baled, and delivered on trucks for shipping. All cotton seed, other than the seed required by the Government for cotton-growers for planting and for planting Government experimental plots, and all linters and by-products, should be the property of the company, but the company should pay to the Government such price as may be mutually agreed upon.

The company, at the request of the Minister, should consign, free of cost on railway trucks at the factory to cotton-growers for planting and for planting on Government experimental plots, such cotton seed of best quality as might be necessary. Such cotton seed should be delivered, properly bagged or baled, at such times and in such quantities as the Minister should require; and the company should charge ½d. per lb. for seed so delivered to cotton-growers as its agents, and should demand and receive the payment therefor on behalf of the Government.

The company should have the right to refuse to accept delivery of or issue a certificate for any cotton which is diseased, stained, or immature, or is not of good quality; but shall notify the Minister and the consignor that such cotton is diseased or not of good quality, and the Minister should determine whether it should be accepted, and, if so, at what rate and upon what terms.

The Government appoints the company the sole agent of the Government for the shipping and sale of the lint produced from seed cotton. The company, if required by the Government, should sell any portion of lint in Australia that the Government desired.

The company is to act as agent for the Government in connection with the carrying out of the existing agreement between the Government and the British Cotton Growing Association. All lint not of quality for acceptance by the said association shall be sold by the company at the best price procurable.

The company may allow not more than two months' credit to any customer, but may not, without the consent of the Minister, allow any longer credit.

The company shall be entitled to a commission at the rate of 1½ per cent. on all lint delivered by the company to the British Cotton Growing Association or any person or corporation, and a commission at the rate of 2½ per cent. on all lint sold by the company, including lint sold by the company after rejection by the British Cotton Growing Association, but no commission is to be paid if the company, either directly or indirectly, becomes the purchaser of or is in any way interested in the purchase of any lint, the subject-matter of the agreement.

The company at all times must permit the Auditor-General of Queensland, or authorised person, to examine and audit all books and accounts of the company relating to the agreement. The agreement is to take effect from 1st August, 1923.

An addendum states that the agreement is extended for a period of two years from 31st July, 1924, upon the same terms and conditions as contained in the agreement.

General Notes.

The Pan-Pacific Congress.

Members of the staff of the Department of Agriculture and Stock attending the Pan-Pacific Science Congress in Melbourne are Messrs. Henry Tryon (Government Entomologist and Vegetable Pathologist), H. T. Easterby (Director of Sugar Experiment Stations), and Edmund Jarvis (Entomologist, Bureau of Sugar Experiment Stations).

Curassows Added to Zoological Collection.

A pair of curassows have recently been received from Mr. E. Joseph, Sydney, as an addition to the Brisbane Botanic Gardens zoological collection. The cu-rass-ow, native of Brazil, is a large black bird, about the size of a hen turkey, possessing a red bill with sharp cutting edges not unlike a parrot's. The general appearance of these birds is somewhat like the well-known water fowl "Red Bill," but they are much larger, having a small crest on the head, and tail feathers not unlike a turkey's.

Model Australian Irrigation Farm for Wembley.

"At the meeting of the Australian Commission of the British Empire Exhibition, which was recently held in Adelaide, it was decided to arrange for a display of a model irrigation farm at Wembley Park, London." Hon. A. J. Jones (Minister for Mines), the chairman of the Queensland Commission, made this announcement last week, adding: "The model farm will represent a typical irrigated holding on the Murray River basin, having 15 acres in fruit and 50 acres in fodder for dairying. The model will be 80 ft. by 32 ft., or on a scale of approximately 1 in. to the yard. The model, including implements, will be prepared in Australia. Arrangements are being made to prepare the land for the model irrigation farm, which will be located in the grounds of the Australian section of the Empire Exhibition. Fodder plants and grasses will be raised on the site, which will be fenced and provided with a good water supply. The model of the farm will be prepared by the State Rivers and Water Supply Commission in Victoria."

"Bunchy Top" in Bananas—Commonwealth Co-operation with States in Research Work.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) said recently in the course of a Press announcement that it would be remembered that an arrangement had recently been made with the New South Wales Government, under which the two States concerned are to share the expenses for the investigation into "Bunchy Top," and that Dr. Darnell Smith and Mr. Henry Tryon are to conduct the research according to the methods which appeal to them, and are to submit a report not later than 31st December next. Since then the Commonwealth Government has offered to take part in the investigations and to furnish £1,500 towards the cost, provided the Governments of New South Wales and Queensland contribute an equal amount. The two States have agreed to the proposal, and Sir George Knibbs, Chairman of the Commonwealth Bureau of Science and Industry, as representing the Federal Government, has been informed of the acquiescence of the Queensland Government in the proposal.

When to Cut Lucerne—Results of Experiments.

In experiments carried out over a number of years at Utah Agricultural Experiment Stations to determine the best time for cutting lucerne, it was found that as regards the amount of increase in live weight produced on a given area the relative value of the cuts was as follows:—Early cut (immediately after flowering), 100; average cut (one week after flowering begins), 71. Cattle fed with lucerne hay, with or without grain supplement, ate a little more hay per day and made more rapid gains in live weight when given early-cut lucerne hay than with late-cut lucerne hay. Given equal weights of hay, the earlier cut produced the best results. In the case of the second and third cut the proportion was as 100, 85, 75. The amount of hay consumed per head and per day was about the same, whether the hay was cut early or late, although rather larger quantities of the former were eaten than of the latter. The amount of dry matter and digestible matter required to produce a certain increase in live weight was, however, decidedly less in the case of the early crop, and more in that of the late crop. The proportion for the three cuts was as 100, 131, 166.

Ginnery "Souvenirs"—A Unique Collection.

One of the most interesting exhibits at the Brisbane Show was a collection of articles picked out of seed cotton sent to the ginneries, articles that are exceedingly dangerous in the process of ginning as probable causes of fire and certain causes of damage to the intricate and delicate machinery of the gins. In the collection were a stirrup iron, a cigar butt, wax matches, a child's doll, a baby's bib, a sixpenny piece, a child's shoe, a massive eye-bolt, live rifle cartridges, and even a cob of corn. Though there was something humorous in the collection, such carelessness of consignors might easily cause a tragedy in the mill. Cotton is most inflammable, and actually one article shown did result in a fire.

A Tea-growing Proposal.

Some weeks ago, Mr. C. H. Witherington, a teagrower from Assam, came to Brisbane with the object of seeking to encourage the cultivation of tea. He discussed the matter with the Premier (Hon. E. G. Theodore) and the Minister for Agriculture (Hon. W. N. Gillies), the latter informing him that he would consider the advisableness of establishing an experimental area to ascertain whether tea could be grown on a commercial basis. Mr. Witherington, who is now in New South Wales, has been advised by the Minister for Agriculture that the Government is not willing to do anything in the matter just now, principally because in present circumstances the Government requires for other purposes the money that would be necessary for such a project.

Seed Cotton Deliveries.

The British Australasian Cotton Association, Limited, advises that the receipt of seed cotton at the various ginneries to 14th August, was as follows:—

	lb.	£ s. d.
Rockhampton	3,630,725	79,271 4 8
Wowan	1,757,941	40,275 7 8
Whinstanes	4,503,171	102,382 5 10
Gayndah	711,816	16,311 9 8
Dalby	402,161	9,215 12 1
Totals	11,005,814	247,455 19 11

The Tiller at the Tiller—Broken Nature Restored.

Thus a writer in the "Freeman":—"To the scene of devastation at Ypres came the technicians, the scientists, the agricultural experts, the foresters, the bankers, the statesmen . . . Weeks passed in council and conference and consultation. Then the collective judgment of this carefully selected group was solemnly pronounced; devastated Flanders was beyond hope of redemption. Never again could it become the land of the plough and the harrow, the crop and the flock. Then came man and his shovel. With no word of complaint, with no scientific suggestion or device, with no shuffling of the dirty old cards, with no mournful pleading for aid, with no saintly prostestations to heaven, the men and the women and the children took their shovels in their hands, and went down into this waste, hour by hour, day by day, week by week. . . . To-day the fields of Flanders are green."

The 1922 Wheat Crop.

The following return, compiled by the Registrar-General, shows the result of the wheat crop for Queensland for 1922:—

Division.	Estimate.		Actual.	
	Acres.	Bushels.	Acres.	Bushels.
Moreton	516	9,096	450	7.482
Wide Bay	794	4,733	961	12,404
Maranoa	1,707	14,400	2,167	9,061
Downs	146,786	1,873,017	141,914	1,848,889
Total State, 1922	149,803	1,901,246	145,492	1,877,836
Total State, 1921	..	..	164,670	3,025,786
Decrease, 1922	..	..	19,178	1,147,950
Decrease, Actual, on Estimate 1922	..	..	4,311	23,410

Staff Changes and Appointments.

Mr. E. H. G. George has been appointed Cane Tester at Invicta Sugar Mill, which commences crushing operations on the 29th August.

Mr. E. J. Shelton, of Strathfield, New South Wales, has been appointed Instructor in Pig Raising, as from the 17th August, 1923.

Mr. W. R. Burnett, formerly acting Inspector of Stock at Durah, has been appointed Inspector of Stock, as from the 17th August, 1923.

Messrs. J. S. Penrose (B.V.Sc., M.R.C.V.S.) and M. J. Reidy (M.R.C.V.S.) have been appointed Part-time Veterinary Officers The former is to be stationed in the Central district, and the latter in the Northern district.

Mr. W. C. Woodhouse, District Inspector of Stock, Normanton, has been transferred to Bowen; and Inspector Logan, of Cloncurry, has been transferred to Normanton.

The Officer in Charge of Police at Babinda has been appointed an Acting Inspector under the Diseases in Stock Act.

Police Constable Bernard McDonnell has been appointed an Inspector under the Slaughtering Act.

Maurice Robinson Tennent, of the Dairy Branch of the New Zealand Department of Agriculture, has been appointed Dairy Instructor in the Queensland Department.

W. B. Horneman, Assistant Dairy Instructor at the Queensland Agricultural High School and College, has been appointed an Inspector under "*The Dairy Produce Act of* 1920."

The resignation of P. H. M. Goldfinch, as Millowners' Representative on the Central Sugar Cane Prices Board, has been accepted as from the 31st August, 1923.

The appointments of the following officers of the Department have been confirmed:—

- William Rowlands, as Fruit Packing Instructor, as from the 17th January, 1923;
- Harold L. Pentecost, as Herd Tester, as from 1st January;
- William Maggs, as Inspector under the Diseases in Plants Act, as from the 25th January, 1923;
- Douglas F. Keith, as Herd Tester, as from the 1st January, 1923;
- Frank T. Heers, as Dairy Inspector, as from 1st January;
- Eileen Mary Boody, as Typist, as from the 15th January; and
- Edward F. Duffy, as Inspector under the Diseases in Plants Act, as from the 22nd February, 1923.

Answers to Correspondents.

Agricultural Tile Draining.

E.T.B. (Eumundi)—

"Land Drainage," by Powers and Teeter, is a standard work. The present Brisbane prices for pipes for field drainage are: 2-inch, 23s. per 100; 3-inch, 34s. 6d. per 100; 4-inch, 52s. per 100; 6-inch, 77s. 6d. per 100.

Leg Weakness in Chickens.

H.J.T. (Roma).—Mr. J. Beard, Poultry Instructor, advises:—

Leg weakness in chickens is sometimes caused by over-feeding with fat-producing foods, or by an insufficiency of bone and muscle-forming material. It may also be due to constitutional weakness; when such is the case, the complaint will be manifested in young chickens. If affected chickens are restored to health they should never be used for breeding purposes as they will transmit the weakness to the offspring. Do not allow the chickens to camp in a wooden box or on a boarded floor, if this is unavoidable place a corn sack under them. This provides a grip for the feet and prevents their legs from spreadeagling. If you are using the water from the house tank for their drinking water add Douglas Mixture or a few drops of tincture of iron. This Department's pamphlet on "Poultry" is now out of print, but a copy of the new edition will be forwarded to you when available. Two copies of "Poultry," a journal published in Sydney and containing a lot of seasonal information, has been forwarded by post.

Asphalt.

J.H. (Gooroolba).—The City Engineer, Mr. E. F. Gilchrist, advises:—

The term asphalt has a wide range and is used to denote bitumen. Asphalt, which is composed of bitumen as a binder used to hold or cement the aggregate (particles of sand, stone, chips, &c.) together, and even when tar is used as a binder the resultant mixture is termed asphalt.

If the word tarpaving is substituted it makes the necessary distinction. I presume tarpaving is what is meant. If your correspondent is in a district where a stone crusher is at work and can get the run of crusher aggregate —*i.e.*, the material as it comes from the crusher, and separates sufficient material for his work that will pass through a three-eighth square mesh sieve, the desired grading will be obtained.

If, on the other hand, he has to make up the aggregate, it will be necessary to procure 100 per cent. material passing a three-eighth square mesh, 30 per cent. of which shall be retained on one-eighth mesh, 15 per cent. on 20 mesh, and the balance of 45 per cent. will grade down to the finest sand or stone dust procurable to which 10 per cent. of tar shall be added. If the aggregate can be brought to within 10 or 15 per cent. of these figures a good mixture should result.

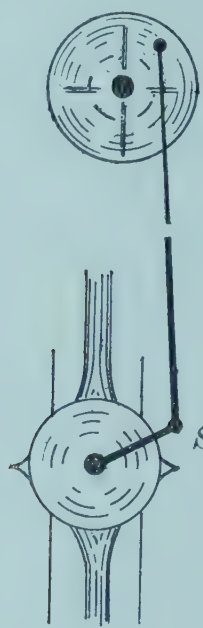
The tar should be poured into a flattened heap and raked over with a stiff rake till properly mixed. The tar should be boiled to the proper consistency; or better, distilled or prepared tar purchased.

The mixture will require from 18 to 23 gallons of tar per cubic yard of aggregate, depending upon the amount of fines contained therein. The finished surface should be dusted with dust or fine sand.

Horse-Gear Attachment for Semi-Rotary Pump.

W.W. (Kilkivan)—Mr. A. E. Gibson, Instructor in Agriculture, replies:—

This correspondent does not supply sufficient information as to the "direction of drive" from horseworks to semi-rotary—whether it is horizontal or vertical. It is suggested that the attachment of a geared pumping head would be a better system than that by direct coupling from horseworks to semi-rotary pump handle, also vertical drive is to be preferred to a horizontal drive.



Shoulder Sores in Working Horses.

A.H. (Kingaroy)—Mr. A. McGown, M.R.C.V.S., Veterinary staff, advises:—

As these sores are caused by badly-fitting collars, it is necessary before treatment to see that the collar fits properly. In most cases it will be found necessary to chamber the collar—*i.e.*, a hole must be cut in the leather which comes in contact with the sore and the padding pushed in equally all around so as to make a hole which will prevent rubbing. After this has been done the sore should be dressed twice daily with this solution:—Powdered alum, ½ oz.; water, 1 pint.

Orchard Notes for October.

THE COAST DISTRICTS.

October is frequently a dry month over the greater part of Queensland, consequently the advice that has been given in the notes for August and September regarding the necessity of thorough cultivation to retain moisture is again emphasised, as, unless there is an adequate supply of moisture in the soil to meet the trees' requirements, the coming season's crop will be jeopardised, as the young fruit will fail to set.

Thorough cultivation of all orchards, vineyards, and plantations is therefore imperative if the weather is dry, as the soil must be kept in a state of perfect tilth, and no weeds of any kind must be allowed to grow, as they only act as pumps to draw out the moisture from the soil that is required by the trees or fruit-yielding plants. Should the trees show the slightest sign of the want of moisture, they should be given a thorough irrigation if there is any available means of doing so, as it is unwise to allow any fruit trees to suffer for want of water if there is a possibility of their being supplied with same. Intermittent growth, resulting from the tree or plant being well supplied with moisture at one time and starved at another, results in serious damage, as the vitality is lessened and the tree or plant is not so well able to ward off disease. A strong, healthy, vigorous tree is frequently able to resist disease, whereas when it has become debilitated through neglect, lack of moisture or plant food, it becomes an easy prey to many pests. If an irrigation is given, see that it is a good one and that the ground is soaked; a mere surface watering is often more or less injurious, as it is apt to encourage a false growth which will not last, and also to bring the feeding roots to the surface, where they are not required, as they only die out with a dry spell and are in the way of cultivation. Irrigation should always be followed by cultivation, so as to prevent surface evaporation and thus retain the moisture in the soil.

All newly planted trees should be carefully attended to, and if they show the slightest sign of scale insects or other pests they should receive attention at once. All growth not necessary to form the future tree should be removed, such as any growths on the main stem or main branches that are not required, as if this is done now it will not only save work later on, but will tend to throw the whole strength of the tree into the production of those limbs that will form the permanent framework of the tree. In older trees all water sprouts or other similar unnecessary growths should be removed.

Keep a good lookout for scales hatching out, and treat them before they have become firmly established and are coated with their protective covering as they are very easily killed in their early stages, and consequently much weaker sprays can be used. The best remedies to use for young scales hatching out are those that kill the insects by coming in contact with them, such as miscible oils, which can be applied at a strength of 1 part of oil in 40 parts of spraying material and will do more good than a winter spray of double the strength. In the use of miscible oils or kerosene emulsion, always follow the directions given for the use of these spraying materials, and never apply them to evergreen trees when they are showing signs of distress resulting from a lack of moisture in the soil, as they are then likely to injure the tree, whereas if the tree is in vigorous growth they will do no harm whatever.

All leaf-eating insects should be kept in check by the use of an arsenate of lead spray, taking care to apply it as soon as the damage appears, and not to wait till the crop is ruined. Crops, such as all kinds of cucurbitious plants, tomatoes, and potatoes are often seriously injured by these insects, and the loss occasioned thereby can be prevented by spraying in time. In the case of tomatoes and potatoes, a combined spray of Bordeaux or Burgundy mixture and arsenate of lead should be used, as it will serve the dual purpose of destroying leaf-eating insects and of protecting the plants from the attack of Irish blight.

Grape vines require careful attention, and, if not already sprayed with Bordeaux mixture, no time should be lost in applying this material, as the only reliable method of checking such diseases as anthracnose or black spot and downy mildew is to protect the wood and foliage from the attack of these diseases by providing a spray covering that will destroy any spores that may come in contact with them. The planting of bananas and pineapples can be continued during this month. See that the land is properly prepared and that good healthy suckers only are used. Keep the plantations well worked, and allow no weed growth. Keep a very careful lookout for fruit flies; destroy every mature insect you can, and gather and destroy every fallen fruit. If this is done systematically by all growers early in the season, the subsequent crops of flies will be very materially decreased. See that all fruit sent to market during the month is carefully handled, properly graded, and well packed—not topped, but that the sample right through the case or lot is the same as that of the exposed surface.

GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Much of the matter contained under the heading of "The Coast Districts" applies equally to these parts of the State, as on the spring treatment that the orchard and vineyard receives the succeeding crop of fruit is very largely dependent. All orchards and vineyards must be kept in a state of perfect tilth, and no weed growth of any kind should be allowed. In the Western districts, irrigation should be given whenever necessary, but growers should not depend on irrigation alone, but should combine it with the thorough cultivation of the land so as to form and keep a fine soil mulch that will prevent surface evaporation.

All newly planted trees should be carefully looked after and only permitted to grow the branches required to form the future tree. All others should be removed as soon as they make their appearance. If there is any sign of woolly aphis, peach aphis, or scale insects, or of any fungus diseases on the young trees, these diseases should be dealt with at once by the use of such remedies as black leaf forty, Bordeaux mixture, or a weak oil emulsion. In older trees, similar pests should be systematically fought, as if kept in check at the beginning of the season the crop of fruit will not suffer to any appreciable extent. Where brown rot has been present in previous years, two or more sprayings with Bordeaux mixture can be tried, as they will tend to check other fungus growths, but at the same time the sodium or potassium sulphide sprays are more effectual for this particular disease and should be used in preference when the fruit is nearly full grown. All pear, apple, and quince trees should be sprayed with arsenate of lead—first when the blossom is falling, and at intervals of about three weeks. Spraying for codlin moth is compulsory in the fruit district of Stanthorpe, and wherever pomaceous fruits are grown it must be attended to if this insect is to be kept in check.

In the warmer parts a careful watch should be kept for any appearance of the fruit fly, and, should it be found, every effort should be made to trap the mature insect and to gather and destroy any affected fruit. If this is done, there is a good chance of saving the earlier ripening summer fruits, if not the bulk of the crop. Tomato and potato crops will require spraying with Bordeaux mixture, as also will grape vines. Keep a very strict watch on all grape vines, and, if they have not already been treated, don't delay a day in spraying if any sign of an oil spot, the first indication of downy mildew, appears on the top surface of the leaf. Spraying with Bordeaux mixture at once, and following the first spraying up with subsequent sprayings, if necessary, will save the crop, but if this is not done and the season is favourable for the development of the particular fungus causing this disease, growers can rest assured that their grape crop won't take long to harvest.

Where new vineyards have been planted, spraying is also very necessary, as if this is not done the young leaves and growth are apt to be so badly affected that the plant dies.

THE HOME PROJECTS SCHEME.

With the particular objects of noting the progress made in the home projects scheme connected with the Nambour Rural School, Mr. J. D. Story, I.S.O. (Public Service Commissioner and Chairman of the Administrative Committee of the Council of Agriculture), accompanied by Mr. B. J. McKenna (Under Secretary for Education) and Mr. L. Morris (Superintendent of Technical Education) visited Nambour in the course of the month. Practical results from two of the home projects—the packing classes and the pig club—were very much in evidence, and would seem to remove any doubts about the ultimate success of the home projects scheme. A packing competition for school children was held at the local district show, and the pupils acquitted themselves very creditably, showing great dexterity in the packing, and giving evidence that they had been carefully trained. Such practical training cannot have anything but an excellent effect on the children. In addition, eleven pigs had been entered, and their condition clearly demonstrated that the children had exercised much care in the rearing and feeding their live stock, their work receiving warm praise from practical producers, who were present at the show. The Home Projects and Agricultural Clubs have been established on the assumption that many boys and girls wish to make money by farming, that the agricultural institutions have information that will help farmers to increase their profits, and that the chances of success are increased greatly when several persons in the same neighbourhood undertake the same work. The home farm provides special advantages, for it supplies opportunities to a boy to gain experience in the application of farming principles which he learns at the rural school. The home project is intended to throw the boy on his own resources, and thus to develop his powers of initiative, as well as to give him increased knowledge and skill in farming methods. In addition, the scheme has the further advantage of bringing parents and teachers into closer relationship. Finally, the financial end is not lost sight of, for profit is the definite aim of all such projects, as it is the aim of the farming business as a whole.

Farm and Garden Notes for October.

FIELD.—With the advent of warmer weather and the consequent increase in the soil temperature, weeds will make great headway if not checked; therefore our advice for last month holds good with even greater force for the coming month. Earth up any crops which may require it, and keep the soil loose among them. Sow maize, sorghum, setaria, imphee, panicum, pumpkins, melons, cucumbers, marrows. Plant sweet potatoes, yams, peanuts, arrowroot, tumeric, chicory, and ginger. Coffee plants may be planted out. There are voluminous articles in previous journals giving full instructions how to manage coffee plants, from preparing the ground to harvesting the crop, to which our readers are referred.

KITCHEN GARDEN.—Our notes for this month will not vary much from those for September. Sowings may be made of most vegetables. We would not, however, advise the sowing of cauliflowers, as the hot season fast approaching will have a bad effect on their flowering. French beans, including butter beans, may be sown in all parts of the State. Lima and Madagascar beans should also be sown. Sow the dwarf Lima beans in rows 3 ft. apart with 18 in. between the plants. The kitchen garden should be deeply dug, and the soil reduced to a fine tilth. Give the plants plenty of room, both in sowing and transplanting, otherwise the plants will be drawn and worthless. Thin out melon and cucumber plants. Spraying for fungoid diseases should be attended to, particularly all members of the *Cucurbitaceæ* and *Solanum* families, of which melons and tomatoes are representative examples. Give plenty of water and mulch tomatoes planted out last month. Asparagus beds will require plentiful watering and a good top-dressing of short manure. See our instructions in "Market Gardening," obtainable on application to the Under Secretary, Department of Agriculture and Stock. Rosella seeds may be sown this month. No farm should be without rosellas. They are easily grown, they bear heavily, they make an excellent preserve, and are infinitely preferable to the mulberry for puddings. The bark supplies a splendid tough fibre for tying up plants. The fruit also makes a delicious wine.

FLOWER GARDEN.—The flower garden will now be showing the result of the care betowed upon it during the past two months. The principal work to be done this month is the raking and stirring of the beds, staking, shading, and watering. Annuals may be sown as directed for last month. Plant tuberose, crinum, ismene, amaryllis, pancratium, hermocallis, hippeastrum, dahlias, &c. Water seedlings well after planting, and shade for a few days. Roses should now be in full bloom. Keep free from aphis, and cut off all spent flowers. Get the lawn-mower out and keep the grass down. Hoe the borders well, and trim the grass edges.

RINGING A BULL.

No great skill is required in ringing a bull. The necessary instrument is a bull punch, which cuts a clean passage through the septum dividing the two nasal cavities. The correct position for piercing is immediately below the cartilage. If the passage is made through the cartilage sensation is not very keen, and the animal is not under the same restraint as when the passage is made through the soft tissues.

FODDER FOR STARVING STOCK.

The protracted dry spell in some of the Southern districts has created a fairly heavy demand for relief fodder under the system established by the Government, and the State Produce Agency has been busily engaged in procuring fodder and despatching consignments to the affected areas. A question as to alleged delays in delivery was recently raised in Parliament, and in reply to which the Minister for Agriculture and Stock (Hon. W. N. Gillies) stated that he was unaware of the occurrence of any delay, and, contrarily, his department held a large number of complimentary letters from farmers in the drought-stricken areas respecting the expeditious despatch and delivery of fodder for relief purposes.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1923.	JULY.		AUGUST.		SEPTEMBER.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·46	5 6	6·36	5·20	6 9	5 36
2	6·46	5·6	6·35	5·21	6·8	5·36
3	6·46	5·6	6·34	5·22	6·7	5·37
4	6·46	5·6	6·33	5·23	6·6	5·37
5	6·46	5·6	6·32	5·24	6·4	5·38
6	6·46	5·7	6·31	5·24	6·3	5·38
7	6·46	5·7	6·31	5·24	6·2	5·39
8	6·46	5·7	6·31	5·24	6·0	5·39
9	6·46	5 8	6·30	5·24	5·59	5·40
10	6·45	5·8	6·29	5·25	5·58	5·40
11	6·45	5·9	6·29	5·25	5·57	5·41
12	6·45	5·10	6·28	5·26	5·56	5·42
13	6·44	5·11	6·27	5·27	5·54	5·43
14	6·44	5·12	6·26	5·28	5·53	5·44
15	6·43	5·12	6·25	5·29	5·52	5·44
16	6·43	5·12	6·25	5·29	5·51	5·44
17	6·43	5·12	6·24	5·29	5·50	5·44
18	6·43	5·13	6·23	5·30	5·49	5·45
19	6·43	5·13	6·22	5·30	5·48	5·45
20	6·43	5·13	6·21	5·30	5·47	5·45
21	6·42	5·14	6·20	5·31	5·46	5·45
22	6·42	5·14	6·19	5·31	5·45	5·46
23	6·42	5·14	6·18	5·31	5·44	5·46
24	6·42	5·15	6·17	5·32	5·43	5·46
25	6·41	5·15	6·16	5·32	5·42	5·46
26	6·41	5·16	6·15	5·33	5·41	5·47
27	6·40	5·17	6 14	5·33	5·39	5·47
28	6·40	5·17	6·13	5·34	5·38	5·48
29	6 39	5·18	6·12	5·35	5·36	5·48
30	6·38	5·18	6·11	5·35	5·35	5·49
31	6·37	5·19	6 10	5·36	...	...

PHASES OF THE MOON, OCCULTATIONS, &c.

6 July ☽ Last Quarter 11 56 a.m.
14 " ● New Moon 10 45 a.m.
21 " ☾ First Quarter 11 32 a.m.
28 " ○ Full Moon 8 33 a.m.

7th July, Apogee, 9·48 p.m.
22nd " Perigee 11·54 a.m.

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5 Aug ☽ Last Quarter 5 22 a.m.
12 " ● New Moon 9 17 p.m.
19 " ☾ First Quarter 4 7 p.m.
26 " ○ Full Moon 8 29 p.m.

4th Aug. Apogee, 4·24 p.m.
16th " Perigee, 8·0 p.m.

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3 Sept. ☽ Last Quarter 10 47 p.m.
11 " ● New Moon 6 53 a.m.
17 " ☾ First Quarter 10 4 p.m.
25 " ○ Full Moon 11 16 a.m.

1st Sept. Apogee, 10·54 a.m.
13th " Perigee 8·24 a.m.
29th " Apogee, 3·24 a.m.

During July the planet Mercury will pass eastwards, apparently from the constellation Taurus, through Gemini and Cancer into Leo. Venus will also apparently pass from Taurus through Gemini into Cancer, Mars from Gemini into Cancer. Jupiter will seem to move only about one degree eastward in Libra, while Saturn will apparently move about a degree and a half further east amongst the stars of Virgo.

From 1st August to 30th September Mercury and Venus will apparently move on through Leo into Virgo, and Mars from the eastern part of Cancer to that of Leo. Jupiter will apparently move only about eight degrees further east in Libra, and Saturn about five and a half degrees in Virgo.

A partial eclipse of the moon, visible in Queensland, will take place about 9 o'clock in the evening of 26th August.

A total eclipse of the sun will take place a fortnight later, visible only in the North Pacific, Central America and Gulf of Mexico.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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QUEENSLAND AGRICULTURAL JOURNAL

VOL. XX. OCTOBER, 1923. PART 4.

Event and Comment.

The Current Issue.

The recent discussion in Parliament on the Upper Burnett, Dawson and Callide Valley settlement schemes add interest to Mr. Eklund's notes on irrigation possibilities in Queensland now running through these pages. In this issue the practical side of water supply is considered and the notes should appeal to farmers generally. Maize is the subject of a special contribution, and the continued summary of experiments carried out by the Bureau of Sugar Experiment Stations furnish valuable data for the agricultural student. The famous Wanganella type of Merino sheep is discussed interestingly in a short special. Regular features cover a wide and informative field.

Co-operation.

Co-operation, like Mesopotamia to the Imperial statesmen of the last generation, has become a blessed word in the farmer's vocabulary; and while the attention of agriculturists is being focused more strongly than ever on the need for business combination, it may be well to give some time to a short review of its guiding principles. Co-operation is not a panacea for all the ills of the farming industry; there is no particular form of magic in the word; it is not a sort of cult covering all the farmer's corporal and spiritual necessities; its adoption does not involve an abandonment of common-sense business principles; it is no remedy for incompetent or out-of-date farming. All it means, briefly, is just a group of individuals with mutual interests combining to secure by prudence, efficiency, and mutual aid more equitable business conditions. The success of the co-operative movement in other countries, particularly among small holders in Denmark, has generated an enthusiasm for a general application of its principles—principles often misunderstood by some of its most clamant advocates. It must, however, be remembered that success in co-operative endeavour, like success in other business ventures, can only be attained by carefully-planned growth and well-directed effort, in which every member of the

combination has been educated to a proper appreciation of the merits and difficulties of this kind of commercial or industrial activity. To be faced at times with almost insuperable obstacles and to meet with discouraging setbacks is a common experience of any co-operative organisation.

Education is Essential.

In order to prepare co-operators for these common experiences of co-operative ventures, to strengthen them in their loyalty and good will towards their own enterprises at inevitable crises in group action, education is indispensable. In prosperous co-operative organisations there is a bond of interest created and maintained only by a constant feeling on the part of members that their venture is well worth while. Such a feeling is engendered and intensified by the sort of education that cultivates a sound knowledge of, and a firm faith in, the underlying principles of the co-operative movement.

Farmers and Co-operation.

Production and marketing must necessarily be on a large scale plan if they are to fit in with the demands of modern conditions, and to the farmer the easiest way to engage in big business is through co-operation. A co-operative enterprise is primarily one of business. Its object is to reduce costs on the come and go of the farmer's needs and products; to cheapen supplies, to lower production costs, to improve marketing facilities, and to provide adequate credit. The materialistic aspect of co-operation is the side that makes the first and strongest appeal to the farmer, but in his absorption in the prospects of immediate material gain he often loses the true spirit of co-operation, the spirit that is of real social significance. ''Once a society becomes a soulless corporation its days are numbered.'' We quote Plunkett, the great Irish authority: ''How many co-operative societies, starting with high hopes, and apparently inspired vision, have failed because the spirit of mutual aid has become atrophied and died?'' ''Co-operation,'' says Smith Gordon, ''is the concrete expression of the associative spirit which is ever present in humanity. It represents the reaction in ordinary men of humble position against the tyranny of a social order which has thrown all the advantages of combination into the hands of the rich and powerful.''

Co-operation means Mutual Aid.

The life-infusing force of the co-operative movement is the spirit of mutual aid. Agricultural co-operation the world over is rooted in economic necessity; it develops from a real need for mutual aid, and though a product of hard, cold realism it is not without a palpitating idealism—the true co-operative spirit without which the movement would be as a husk without corn. Queenslanders have no need to look beyond the borders of their own State for outstanding examples of co-operative success. In the dairying industry alone co-operative progress has been phenomenal. Co-operative principles are being extended to other branches of the farming industry and further extensions are planned. The need for united effort, the primary factor, is already sharply felt in every section of the industry, but there are other essentials which the co-operating farmer must also take into account. Sound business must be the basis of any new organisation. It must be competently directed by men who mean business and who understand business; its members must be taken into the confidence of its directorate; they must fully realise the aims, possibilities, obstacles, and responsibilities, individually and collectively, that pertain to the undertaking. Experience teaches that each and every co-operator should have a clear and complete knowledge of the principles of co-operation. Co-operative success is otherwise bound up in sufficient business; faith in the co-operative idea; existence of the real spirit of mutual help; adequate capital; sound accountancy; loyalty; leadership—and managerial brains at least equal in quality to the brains of the entrenched interests that co-operators will have to fight.

IRRIGATION IN QUEENSLAND—IV.

By H. E. A. EKLUND, late Hydraulic Engineer, Queensland Water Supply Department.

This survey of irrigation possibilities in Queensland commenced in the July Journal with an historical note. In the August number irrigation on the Lower Burdekin was reviewed, and the September instalment covered irrigation in the West. The widespread interest now centred upon land settlement in Queensland, and the general practical development of the forward Government policy in relation to Agricultural extension and the enrichment of rural life in this State, makes the publication of Mr. Eklund's observations particularly timely. The review will be continued through succeeding issues of the Journal.—Ed.

PRACTICAL CONSIDERATIONS.

> "Wherever one finds the most valuable crops, the highest-priced plants, and the greatest prosperity, there one finds Irrigation. With Irrigation the *element of chance* is eliminated. Under the clouds farming is a lottery. The questions are always: 'Will it rain?' 'Will it rain enough?' 'Will it rain at the right time?' All these problems are settled with moisture at convenience and when wanted."—H. A. Wells.

Pioneers in any direction are usually independent and self-reliant. People in general, and independent characters in particular, have more than their share of a human element called perversity. It is perversity which causes us to act against our better judgment when we go to extremes. Mixed with patience, perversity becomes persistence. Add good judgment and a capacity to learn from the experience of others and you have the potentially successful pioneer.

The only way to advise a perverse nature is to tell it *not* to do what you would wish. The man with good judgment will give your "do so" a hearing; think it over, perhaps argue about it, if he does not quite get your meaning; but when he has satisfied himself that your advice was good he will act on it. The perverse man will do the opposite. The following pages are not for the perverse man.

Galileo said, somewhere back in the sixteenth century, that man knew more about the stars in their courses than about the laws governing the flow of water on his own earth. The statement is equally true to-day. Probably the only thing about water that is *nearly* understood by everyone is that "water will find its own level."

This principle governed the first attempts at artificial agriculture. Water was conserved at a high level and let out to a lower level, where the crop was grown. At all events it obeys the laws of gravity. Hence this method of irrigating is called "Gravity system." Nearly all authors and writers on the subject, even in Australia, apparently consider that nothing is worth while but "Gravity system," and yet the first system of irrigation tried in Australia and the one at present most firmly established is a pumping system. It is the most successful and the best known; even out in the far west of Queensland people would seldom enjoy fruits except for Mildura.

This is not to say that a gravity scheme cannot be a success. But a gravity scheme in a country like Australia is a pretty big undertaking, consequently it needs money and people and time to be a success. Some people have expressed the opinion that the Murrumbidgee scheme in New South Wales is not a success. If the crops obtained are so abundant as to cause a glut on the market it may not be a financial success just at once. But under normal conditions it is the *excess* of produce which eventually causes the demand for more, because it is the excess which compels the establishment of commerce* dealing with that particular product, and increases the price to all concerned. Until butter was produced in quantities much too large for home consumption it was a cheap commodity. As soon as the export market was established it became almost a luxury. The same thing is about

* Emerson's definition.

to happen with fruits. The one thing to do is to keep the quality good. The Murrumbidgee River is one of Australia's best assets, and, judging by the quality and quantity of fruit grown on the irrigation settlement, fruit is going to be dear in Australia.

There are lots of irrigation settlements in Victoria; quite a few in South Australia, and some in New South Wales besides Murrumbidgee; but there are none in Queensland. Irrigation is still entirely in the hands of the pioneers, and happily most of these are fairly successful. The most successful are those who know how little water to use; the least successful are those who use the most. Few measure the water applied, and in this case those who measure and know are more successful

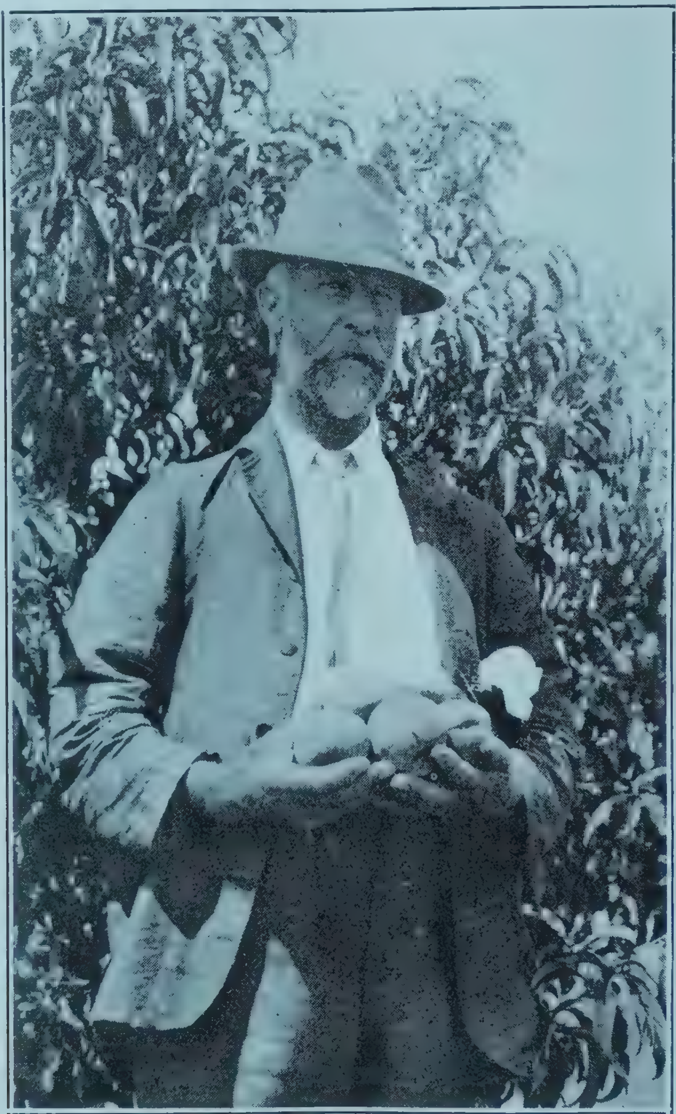


Plate 62.—"Fruits of Irrigation"—Mirrool-Murrumbidgee Scheme.

The peach-tree in the background is two years old. The size of its fruit may be judged by comparison.

than those who do not measure and do not know. And as to grading—those who grade properly irrigate the greatest area with the least labour.

Another error (fortunately but seldom made in Queensland) is that cultivation is not considered necessary when water can be applied at will. Cultivation is more necessary than ever, and happily the rapid growth of weeds in our climate compels frequent cultivation where irrigation is used.

Plate 63.—Drying Peaches and Nectarines at Mirrool.

The fruit is first (usually) cut in half, the stone taken out, and the flesh put on wooden trays of convenient size for handling and stacking. The trays containing the fruit are then put into the sulphur chamber, a room nearly airtight in which 1 lb. of sulphur is burnt for every 1,000 cubic feet of space. Individual settlers usually erect rooms measuring 10 x 10 x 10 for convenience. Sometimes the fruit is dried whole with the stone left in, connoisseurs being of the opinion that this results in a better preservation of flavour. (It is an easy problem in simple arithmetic to prove that dried fruits are more economic to use than canned fruits. Dried fruits should, however, always be soaked in water over night after washing and then cooked without changing the water. This will be found to give a very different result to the more usual method of preparing dried fruits.)

Plate 64.—"Fruits of Irrigation." Sultana Vines at Mildura.

The "Murrumbidgee Irrigation Record" when first issued was to have used the motto "Irrigate; Cultivate and Irrigate." It was changed, however, to its present form, "Cultivate, Irrigate, Cultivate." It may yet be changed to "Cultivate, Cultivate, Cultivate." Cultivation increases absorption by the soil and assists retention. Where the supply is by gravity the settler usually gets a supply of, say, 1 acre foot as his water right. Not till he has used this up need he pay for water, but this is checked where the settler has to pump. Every explosion of an internal combustion engine, every turn of the wheel in the steam engine, and every revolution of the pump adds to the cost of production. Increased cost of production means reduced profit; hence every wise farmer will keep the cost of production down. How can he do this and yet get enough water for his crop?

1. By having first carefully graded his land.
2. By measuring the water he puts on.

THE WATER SUPPLY.

In Major Boyd's record of "Irrigation in Queensland," written some years ago, he remarks that "there is no branch of agriculture which has been so unaccountably neglected in Queensland as irrigation." This is undeniably true, but though it has been so, there is no reason why this "unaccountable neglect" should continue. Queensland is less fortunate than some other States of the Commonwealth in not having visible water supplies; but we have in this State very convenient underground supplies, and they appear more extensive than in any other State. As an illustration, consider the artesian supply available over practically half the area of the State. The coastal deltas of the Burdekin, Don, and, to some extent, the Burnett Rivers are huge natural reservoirs, which have proved to contain not only ample water, but good water and eminently suited for irrigation. The city of Townsville gets a large portion of its water supply from a similar delta, and the writer believes that a good underground supply could be obtained in many other localities.

The apparent reason then for Queensland's inactivity in this respect is that natural water supplies are not evident. But very few settlers have seriously tried to obtain water by sinking. Where it has been done it has met with success in a very great number of cases. It is undoubtedly heart-breaking work to go to the trouble and expense of sinking a well to a great depth without result. It is no wonder that so great a number of people place implicit faith in the water diviner. The fee of a "diviner" is small compared with the cost and disappointment (particularly the latter) of a "duffer."*

It may not be out of place to here mention that some well-known diviners have, by all accounts, done good work; but this profession, like all other callings whose members do not, like the B.M.A., belong to a M.A.S., suffers from an influx of a large number of quacks.

The surest and often the cheapest way of ascertaining if a water supply exists is to make a trial by some simple means. If water is met with the quality can be tested, so avoiding putting down an expensive well giving only brackish water. This is usually the point where nearly, perhaps, every diviner absolutely breaks down; though most of them profess the ability to "divine" the difference between fresh and brackish water.

The simplest and the most inexpensive way to test for water up to a depth of 100 feet is to get a good crowbar, say 8 feet long and $1\frac{1}{8}$ inches thick, well steeled on one end and sharpened to a 3-inch chisel point as shown in sketch. The other end is made with an eye through which a $\frac{3}{4}$-inch thick ring is welded, large enough to accommodate a good $\frac{3}{4}$-inch diameter hempen rope. The only other tool required is about 4 feet of $2\frac{1}{2}$-inch gas or water pipe, having a clack valve at one end and an eyelet for a rope at the other. The method of rigging this plant is as follows:—

Cut a springy sapling about 22 feet long, not too thick for the first 20 feet or 30 feet of depth (say 2 inches at small end without the bark) and rig this as shown in sketch. Start the bore by digging a hole about 2 or 3 feet deep, and when a depth of 5 feet from the surface has been bored drive into it about 4 to 5 feet boiler tube, or other pipe 4 inches in diameter. This should be driven to stand about 6 inches above the surface, and the dug hole then filled in. Drilling is subsequently continued as far as desired by jerking the line down, letting the spring of the pole lift the tools for each blow. The process requires a fair amount of knack, but when the art has been mastered it is not hard work. To avoid a crooked hole keep the cable fairly tight. If too much slack is allowed the tendency is for the hole to shoot off to one side or the other. The rope should be hooked through a swivel at the top of the pole and it must be kept rotating about one-eighth of a turn

* Dry well or bore.

each blow. If this is not done the hole will become flat, not round, and the "sand pump" (the gas pipe with the clack valve) will either not go down or else get stuck.

Until some water has been met with water must be poured into the hole to enable the borings to be lifted out by the sand pump. The churning action of the bar thoroughly mixes the cuttings with the water, and by rapidly raising and lowering the sand pump the mud is picked up and may be raised to the surface.

The art of drilling with the spring pole consists in giving the jerk to the line at the right instant. This instant occurs just when the spring of the pole has lifted the tools and commences to return; not before and not after. A little assistance should also be given to the pole just when it commences to lift the tools. This is necessary to get the longest blow possible.

When water has been struck the amount of the supply may be judged from the time it takes to rise after the hole has been cleaned out. While the sand pump can be used to empty the bore hole the supply is not likely to be very large, but if no impression can be made on the supply by bailing it will pay to put a hand or draw pump on to test. From such a test it will be evident whether it will pay to use a windmill and small pump, or if it would be better to sink a well to the supply. If the strata in which the water is met with are open and porous a 3-inch hole may

Plate 65.—A "Hand" Bore or Bore Sunk by Spring Pole Method in the Near West.

meet all requirements for stock and domestic supply, but if close grained it is necessary to sink a well. As a general rule the ground water supply to a well or bore on the eastern side of the range is proportional to the area of water-bearing strata exposed; but to allow for the "draw-down" effect, if pumping up to the capacity of the bore or well, this theoretical supply capacity should be divided by two. In all cases of doubtful quantity, or where the volume as gauged by the supply from the bore appears barely but nearly sufficient, the well is recommended on account of the extra storage capacity in addition to the greater percolation area exposed.

Irrigation cannot be successfully carried out without a reliable supply of suitable quality. The best time for testing supplies is after dry weather, and the longer the preceding drought the more reliable the test. Any supply which proves good at such a time is more likely to tide the farmer over a bad period than a supply met with in an ordinary season.

Even a moderate supply, if constantly pumped by means of a windmill, can, with care, be made to irrigate quite a fair area. The capacity of the windmill may,

of course, be augmented by having a provision for storage—the larger the better. In the semi-arid districts of America the use of the windmill has lately come very much into vogue, and the Agricultural Department's Bulletin No. 394 quotes instances of the areas that can be irrigated by this means. From 4 to 25 acres per irrigating season are successfully dealt with under various crops, the area irrigated apparently depending on the amount of storage provided, the care exercised in using the water, and the lift. The capacity of the windmill as the source of power for irrigation pumping is, of course, limited; but it is quite clear that more can be done in this direction than has ever been attempted in Queensland.

Careful selection of the site for a mill has a good deal to do with the area it can be made to water. In some cases one windmill is made to pump from two bores situated close together, and owing to the balanced action thus obtained the method is very efficient. See sketch.

Plate 66.—Mallee Country before—

Plate 67.—And after Irrigation.

POWER OF WINDMILLS.

The power supplied by a windmill depends essentially on—

1. Velocity of the wind.
2. Size of the vane wheel or "mill."

The table given below is the summary of tests on a 14-ft. mill tested by officers of the Agricultural Department of the United States, America, with the load varied to get the best results.

Velocity of wind in miles.	Horse-power produced.	Hours per month.	Total horse-power.	Speed of mill in revs. per min.	Load in pounds per stroke.
0–5	0·01	209·9	2·10	2·0	—
6–10	0·27	283·6	76·57	20·0	4·35
11–15	0·85	142·2	120·87	29·5	10·35
16–20	1·80	62·3	112·14	38·0	14·20
21–25	3·45	22·6	77·97	45·0	26·35
26–30	4·82	9·6	46·27	51·0	29·20
31–35	5·60	3·3	18·48	55·0	31·0

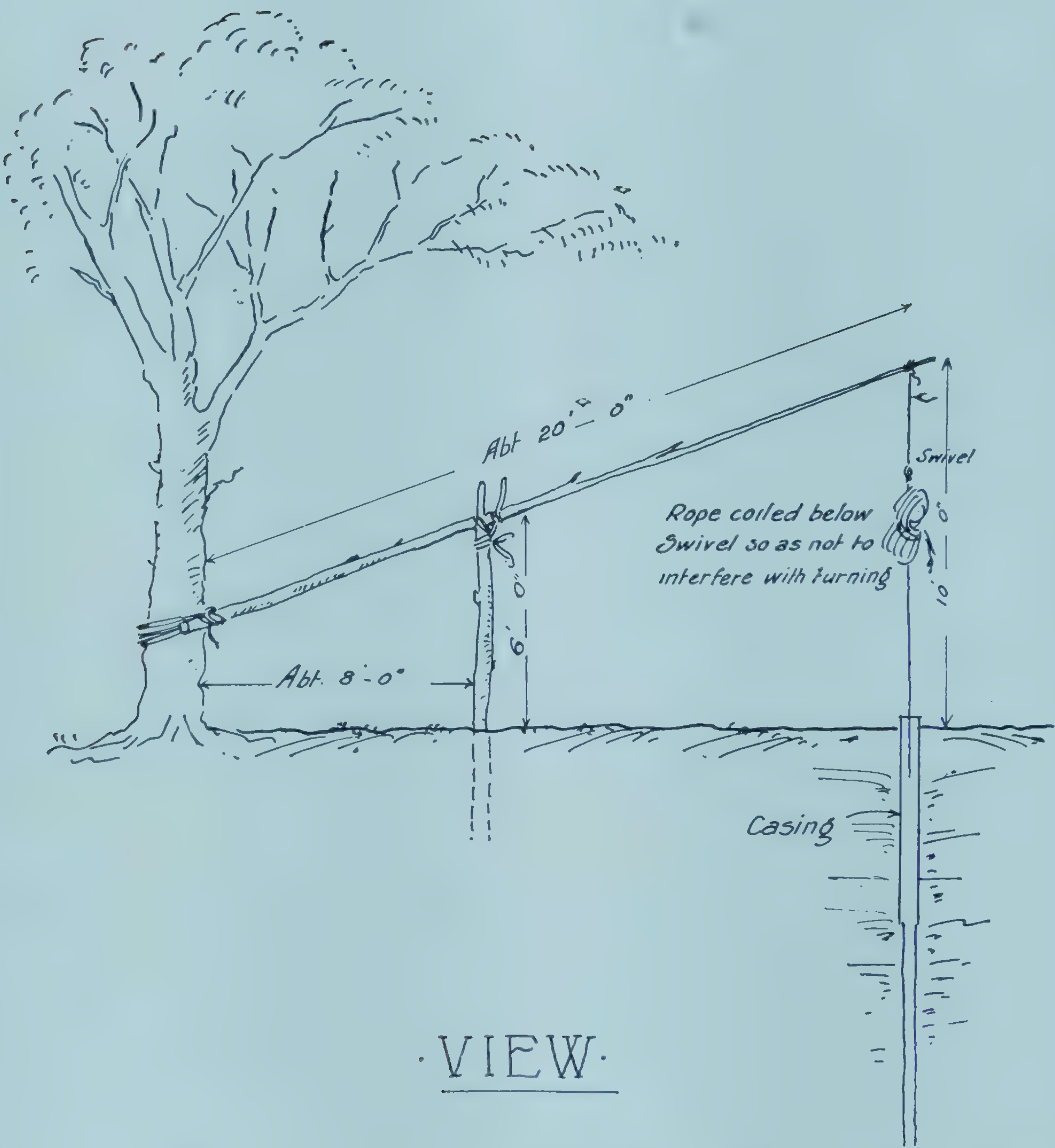
The most usual velocity clearly was from six to ten miles per hour and the largest number of horse-power hours obtained when the velocity varied from eleven to fifteen miles. The table is useful in showing what could be done if the load were varied to suit the strength of breeze, but as yet there is no satisfactory means of doing this. Several makers have tried to discover some arrangement whereby an increase or decrease in the speed of the mill would be automatically accompanied by a lengthening or shortening of the stroke. All such devices have apparently failed in operation, and users are therefore compelled to decide on the most suitable load. To arrive at this by calculation is rather difficult, but it will pay to carry out a few experiments at a time when the wind appears to be blowing with the most generally prevalent velocity. A fairly good method of getting at the velocity of the wind, and quite sufficiently accurate for comparisons, is to drop a light feather of the kind used for pillows or mattresses from a height of about 10 or 12 feet, or, better still, from the tower of the mill, and not by stop-watch how long it takes to travel a certain distance. The distance in feet that the feather travels in a given number of seconds will give the rate in feet per second. This multiplied by .68 will give the velocity of the wind in miles per hour.

The power required will depend on the height to which water has to be lifted. A theoretical horse-power is defined as the power required to lift 33,000 lb. to a height of one foot in one minute. One Imperial gallon of water weighs 10 lb. (approximately) and the theoretical horse-power will, therefore, lift 3,300 gallons 1 ft. in one minute, or 60 feet in one hour. But in actual practice this figure is never reached owing to losses of energy occurring, partly in friction and partly in imperfections of any machine used. In pumping water there is also a certain amount of leakage past a bucket or piston, and this factor (called "slip") also reduces the efficiency. Generally, the type of pump employed for windmill work should give an efficiency from prime mover to water delivered of about 50 per cent. Very much better efficiencies can be obtained with high-class pumps, but for ordinary and smaller pumps 50 per cent. efficiency is a fair average. If a windmill develops one horse-power the actual quantity of water that may be expected with a lift of 60 feet is only 1,500 gallons per hour, or half the theoretical quantity. Where the lift is only 30 feet the quantity pumped by the same power may reasonably be expected to be 3,000 gallons per hour. Assuming that the water-lifting wind blows for eight hours during the day, 24,000 gallons, or a little more than one acre inch is supplied during this time. This quantity is too small for economic distribution during pumping, and it is therefore necessary to provide sufficient storage to have at least 60,000 gallons, or about three acre inches, readily available to economically irrigate one acre.

The size of mill to develop one horse-power in a ten-mile breeze is not a standard size, being apparently about 15 ft. diameter. Stock sizes run 8, 10, 12, 14, 16, 18, and 20 feet; larger sizes than these generally being made to order. Makers' catalogues do not give the rating of a mill at per horse-power, the more usual method being for the maker or agent to quote for a mill of a size warranted to lift a given quantity of water from a certain depth per hour or per day. This method has the advantage that the decision of size is left in the hands of those who, presumably, have some experience of this class of work. But it is not a useful

or convenient method for the farmer or pastoralist, who is thus placed wholly in the hands of the agent. A definite horse-power rating based on an eight-mile breeze as the selected standard would enable users to make their own comparisions, without debarring makers or agents from giving additional advice should this be desired. Some windmills may be better than others according to varying conditions and localities, and where the wind is generally heavy and choppy it may be necessary

BORING: ·by·Springpole·



·VIEW·

to sacrifice efficiency and flexibility for ruggedness and strength. The local resident probably knows best from actual experience of weather conditions in his district which kind would suit him best. Makers claim that the difficulty in obtaining such a rating lies in the fact that even a comparatively "steady" breeze fluctuates considerably. The fluctuations are usually very rapid and make observation difficult.

But where a fair number of mills are turned out and parts are standardised only one carefully conducted rating is necessary for each size, and to maintain a

good product this may be checked from time to time as opportunity offers. Some form of rating must be adopted even in obtaining the water-lifting capacity, and the apparent discrepancies in various mills are probably accounted for by the absence of any scientific method in determining the work performed by the mill.

Some Australian manufacturers are now making windmills up to 30 feet in diameter. A 30-ft. mill should be capable of developing about five theoretical horse-power in a ten-mile wind. A mill of this kind should be useful to those who propose to commence inexpensive irrigation on a small scale. Given a reasonably good water supply within 100 ft. of the surface, and a storage capacity of, say 60,000-80,000 gallons, such a mill should provide ample power for the watering of from 5 to 20 acres, depending on crops to be raised. If the farmer can, in addition, afford to install an engine as an auxiliary, he may be said to have reached the present economical limit in the irrigation of a small area.

The question of "back gearing" a windmill is sometimes a puzzling feature to those not actually having had experience. Back gearing is necessary where the mill has to lift to a great height, or a great quantity of water per stroke, but the work done is accomplished at a reduced rate. The actual power developed by the geared mill is, therefore, if anything, rather a little less than that of the direct-acting. Geared mills are also used where light winds generally prevail, but they should not be necessary for moderate lifts or where fairly good velocities of wind are the rule. The chief differences of the two kinds may be thus stated:—The direct-acting windmill requires a greater velocity of wind to start it, soon reaches its maximum rate of pumping, and continues while the wind is good, but soon ceases when the wind lightens. The geared mill starts in a lighter breeze, takes a longer time to reach its maximum rate of output, maintains it over greater fluctuation in the wind, and ceases pumping more slowly. As might be expected the slip in a direct-acting windmill pump is greater than in the geared mill, especially at high velocities and a short stroke. The former is rather simpler in construction and perhaps generally a cheaper machine. In choosing a mill the points governing the decision do not materially differ from those to be observed in choosing any mechanism.

The mill should be strong and simple, should not require frequent oiling or attention, and parts liable to wear should be easily accessible for examination, adjustment, or renewal. It is an additional security to the buyer to deal with a firm bearing good repute for excellence of product.

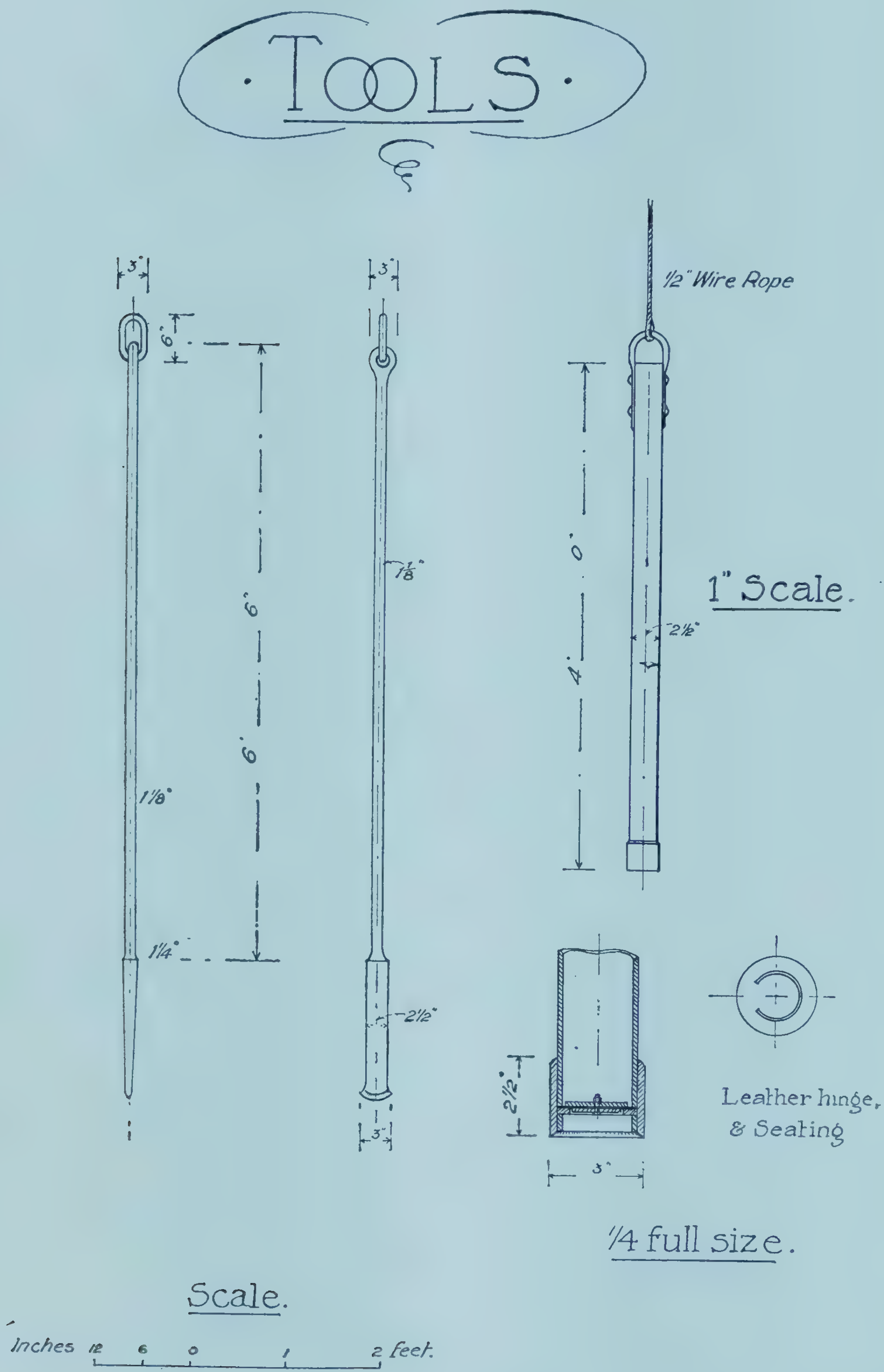
A common error in adjusting mills is making the stroke too short. A short stroke (up to a point) puts as much work on the mill as a longer one, owing to the more frequent stopping and starting of the water column, the inertia of which has to be overcome each time the rods lift it. The stroke should be just the right length, and a few experiments in this direction would soon convince users that economy is obtainable in this direction.

When pumping by windmill from a well, a simple and inexpensive device can be used to steady the flow. The device consists of two 2-in. pipes attached to form an air vessel on the water column (see sketch). These have proved very effective where tried.

Table IV. has been compiled as indicative of what a windmill properly adjusted can do in a ten-mile breeze. To estimate for an eight-mile breeze reduce the number of gallons by approximately one-third.

An analysis of meteorological observations given in Table V. will show that the average velocity of wind at Brisbane Observatory, from 9 a.m. to 9 p.m., is practically only six miles per hour. The average velocity for each month is also shown. It must be noted that the observations were only twelve hours each day, and any wind blowing during the night has not been considered. From a utilitarian point of view the times of morning and evening observations are too early and too late respectively to show what windmill users are anxious to know, *i.e.*, the period each day during which the wind is strongest. General observations would indicate that had observations been taken at 11 a.m. and 7 p.m. the average velocities would be

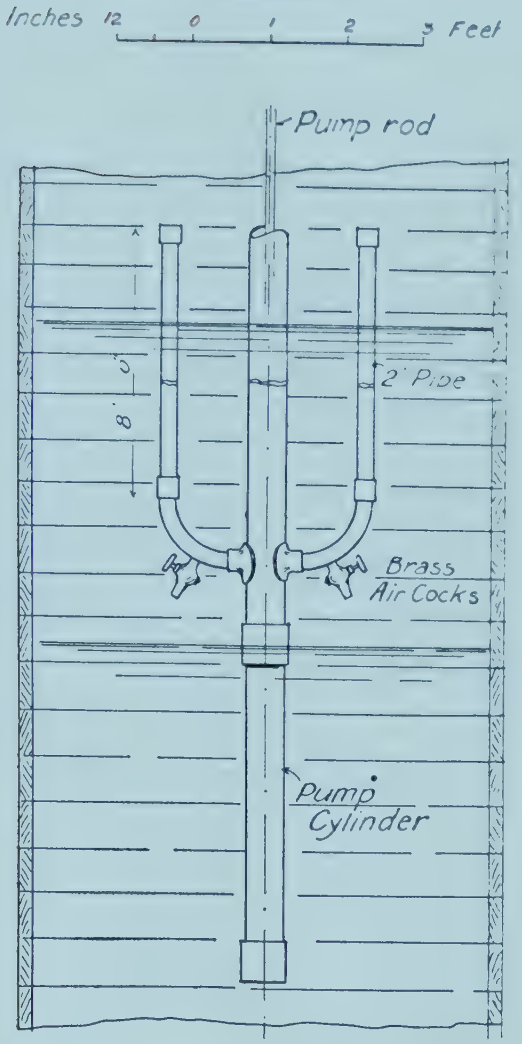
higher. This is especially the case in the western districts, and it is hoped that as anemometers are installed wind velocities will be observed each hour of the day until it is discovered what hours the maximum velocity is attained. Such information



carefully compiled will prove of immense value to pastoralists and settlers, who, in view of a reduced natural flow from bores may, in the near future, have to depend largely on the wind for their water supplies.

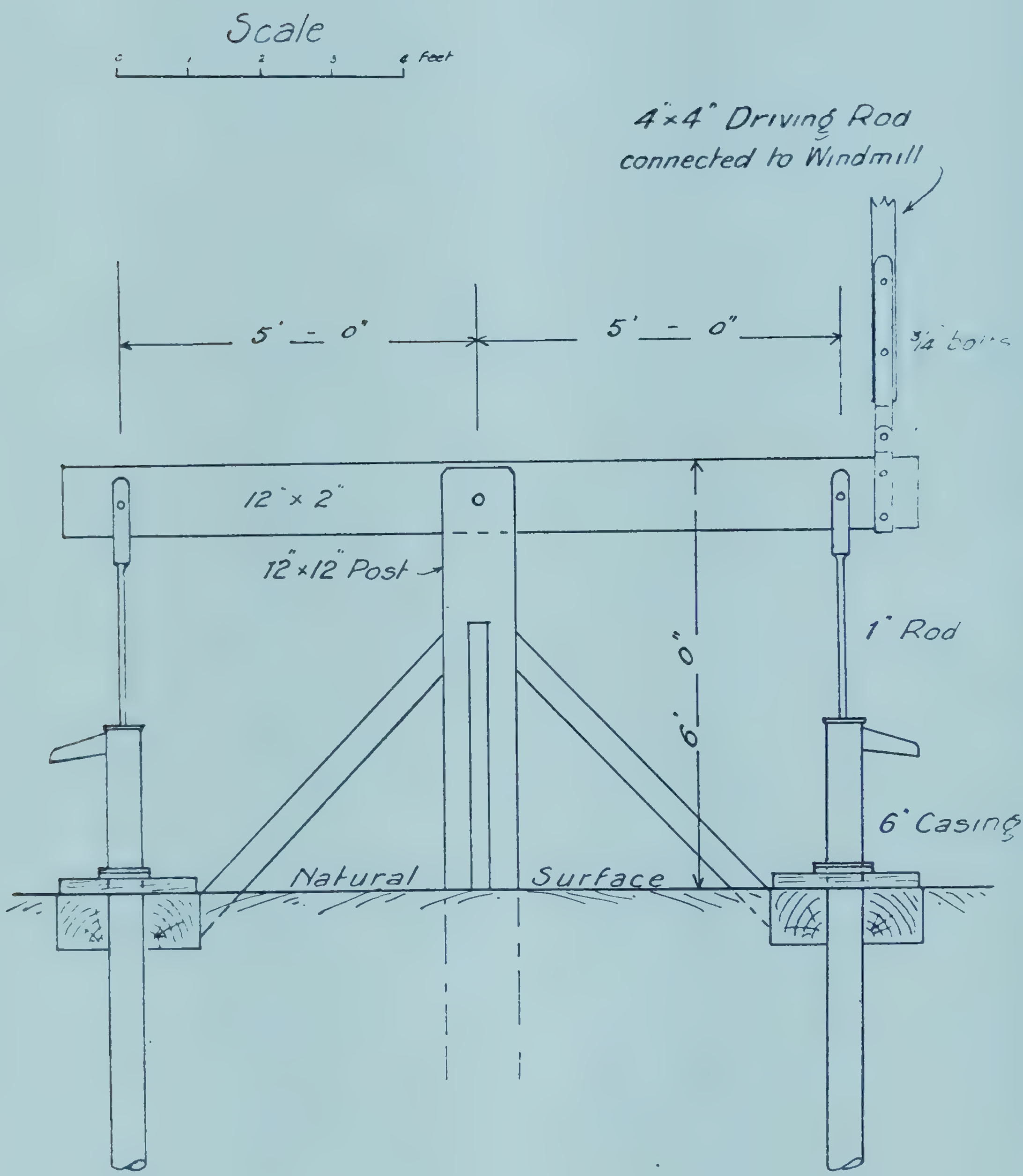
SKETCH,
— shewing —
2" pipes, acting as
Air Vessels

Scale



· SECTION ·

Arrangement shewing one Windmill pumping from two Shallow Bores, near Stockton, Cal.



Elevation.

(The next instalment will deal with Surface Supplies.)

MAIZE OR INDIAN CORN.

By F. F. COLEMAN, Officer in Charge, Seeds, Fertilisers, and Stock Foods Investigation Branch.

The importation of South African maize has again directed attention to our old friends Supply and Demand which, according to economists, regulate the price of commodities. As far back, however, as 1816 an anonymous writer asserted that "price depends on the state of the market, which is not merely the actual present proportion of the supply to the demand but also the expected supplies either from our own resources or from foreign countries, as well as the probable increase or decrease of the demand."

In the August number of the "South African Journal of Agriculture" this season's maize crop is estimated to yield a surplus of 5,000,000 bags for export; in other words, South Africa has produced over 450,000 tons of maize beyond their own requirements. The state of the Queensland market offers an opening for a little of this great surplus. During the month of August 23,257 bags were landed at the port of Brisbane, followed by similar shipments in September. The approximate weight landed during the two months being 4,000 tons. This indicates that there still remains a profit to be made in the importation of sound, dry maize, free from insects likely to be injurious to stored grain.

Maize in the United States is spoken of as corn, which term was used by our Anglo-Saxon ancestors to mean the grain of any cereal plant used as food for man. The term Indian corn being used by the early settlers in North America, to indicate the kind of grain cultivated by the original inhabitants of that country.

The general practice of disparaging the past prevents our seeing the present in its true perspective. Before the first white man landed in the sub-tropical and tropical portions of the Americas, the cultivation and selection of Indian corn had received considerable attention, both by the Incas of Peru as well as at the hands of the North American Indians, who grew a hard, round type of grain well suited to put up with storage under adverse conditions; further, it packed well and was therefore of easy portage. Our adventurers of the sixteenth century have left a series of records as to the crops and inhabitants of the various countries visited. This mine of information is open to all readers of such voyages as were published by Hakluyt, Portlock, and others which have still this merit: that they yield:—

"A certain freshness of the fields,
A sweetness as of home-made bread;
For if the flour be fresh and sound,
And if the bread be light and sweet,
Who careth on what mill 'twas ground
Or of what oven felt the heat?—
Unless, as old Cervantes said,
You are looking after better bread
Than any that is made from wheat."

Columbus and other early voyagers introduced maize to other parts of the world. No doubt it reached Europe and Africa at the end of the fifteenth or early part of the sixteenth century. On its first introduction it appears to have been grown in the countries bordering on the Mediterranean and became known in England as "Guiny wheat" [and in France as Turkish corn (*Ble de Turquie*)—Ed.]; the accepted name during the early part of the sixteenth century appears to be "Turkey wheat," which indicates the usual source of supply as being Turkey. This may not, however, be correct, as the name may only be that of the place of shipment, as is the case with the commodity sold as Turkey rhubarb, which the Turks had the credit of producing, when as a matter of fact the actual country of origin was China, whence it reached Asia Minor *viâ* Russia. The Chinese, according to records found in Paris, appear to have cultivated maize for some centuries, and it is just possible that the first maize grain to reach London came from the Levant and the actual place of its production, China.

According to Harshberger, Mexico appears to have been the original home of the maize plant, although there is no absolute proof of this, it is now generally accepted as being correct.

Maize (Zea Mays L.) belongs to the order Gramineæ or grass family, which includes the plants producing our food grains, such as wheat, barley, oats, and rice as well as the goat of the wheat family, rye, the distinguishing features of commercial maize being the separation of the pollen-bearing from the seed-bearing flowers.

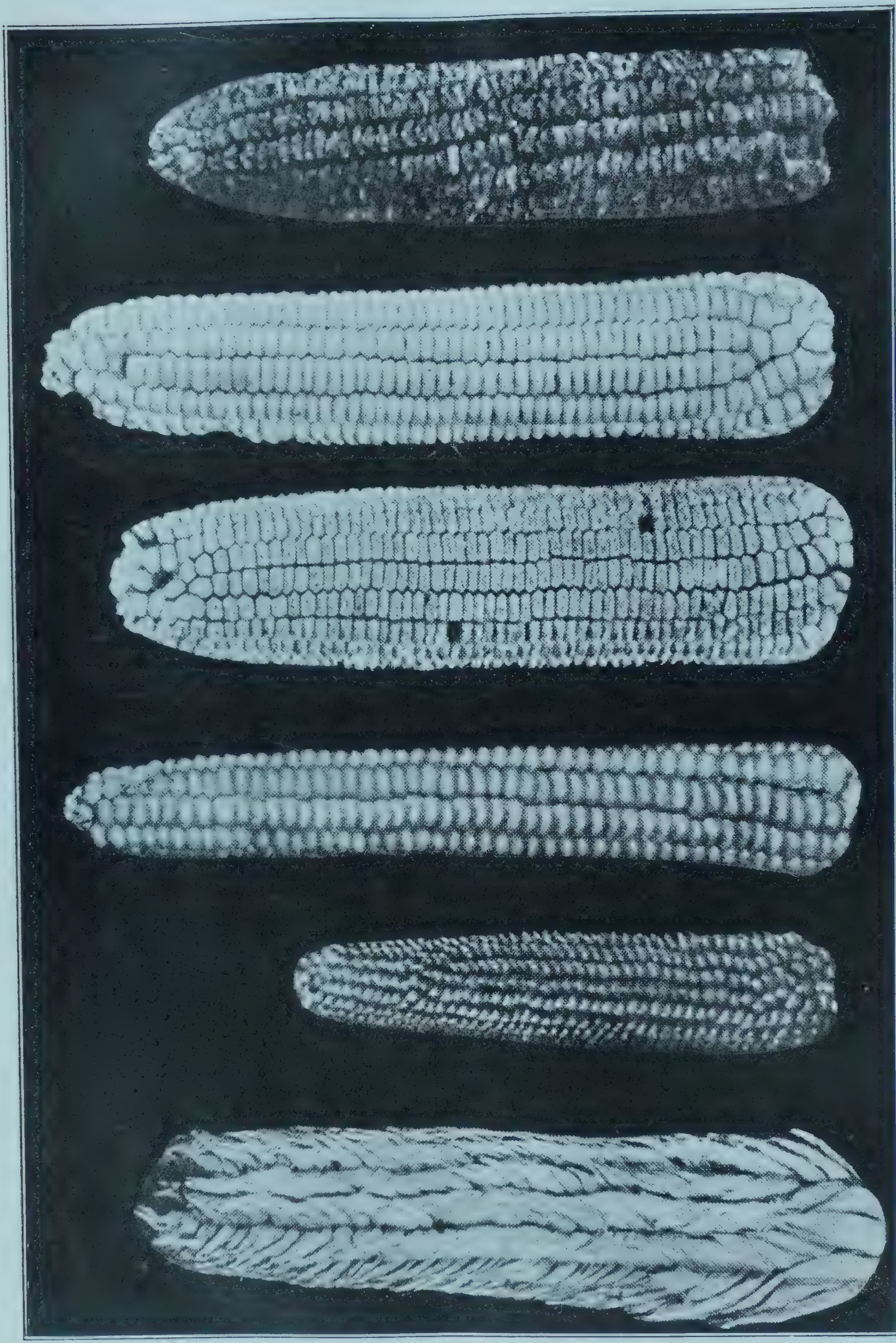


PLATE 68.—MAIZE OR INDIAN CORN.

The nearest relative of maize is Teosinte, with which maize crosses readily; a natural hybrid between these cultivated grasses was described by Watson under the name of Zea canina. From similar crosses Harshberger arrived at the opinion that maize originated from a hybrid of Euchlæna and normal Teosinte. Montgomery, however, reached the conclusion that maize and teosinte had a common progenitor; further that the ancestral form was a large much-branched grass "each branch being terminated by a tassel-like structure bearing hermaphroditic flowers."

Hayes and Garber have pointed out that this theory is strengthened by the types of inflorescence which now and then appear, and the not uncommon occurrence in self-fertilised maize, of plants with a tassel bearing both male and female organs. The many different varieties of cultivated maize are all included under the name Zea Mays L., and were divided by Sturtevant into "species groups" (sub-species) the most important of which are shown in the accompanying illustration after Montgomery.

The six principal types of maize, reading from left to right:—Podcorn, popcorn, flint type, dent type, flour or soft corn, sweet corn.

PLATE 69.

Flint Maize, showing enclosure by horny endosperm. | Dent Maize, showing horny endosperm at sides.

The distinguishing characteristics of the six types are—

Zea Mays tunicata, or podcorn.—Each kernel enclosed in husk; the ear is also enclosed in husk. In true podcorn all forms of kernels may be found. A few podded kernels may also occassionally appear in ordinary types of maize.

Zea Mays everta, or popcorn.—Kernels naked, not enclosed in pod or husk. The popping is due to the turning inside out of the kernel through the explosion of the contained moisture when heat is applied. Two forms of seed are common, one pointed at the top being known as rice popcorn; the other form is rounded like the flint type, and known as pearl popcorn.

Zea Mays indurata, or flint maize.—Grains smooth, roundish, not wrinkled, white starchy endosperm enclosed by a corneous or horny endosperm. This type is still largely grown in countries where the large seeded dent varieties do not mature and was the kind cultivated by the North American Indians and early American settlers.

Zea Mays indentata, or dent maize.—Grains dented, flattened with starchy endosperm extending to top of kernel, corneous or horny endosperm at sides; the shrinking of the starchy endosperm at the top of the grain causes the formation of the dent, from which characteristic it derives its name.

Zea Mays amylacea, flour or soft maize.—This kind is without corneous endosperm, therefore soft, in shape more like flint—that is, the grain is without indentation. The mummy corns of Peru and Mexico probably belong to this group.

Zea Mays saccharata, the sweet corn.—According to East the sweet corns may be dent, flint, or pop varieties which have not the ability to mature starch normally, the few starch grains produced being small, angular, and imperfect.

Other forms of maize are:—Zea canina (Watson), the Maiz de Coyote, a branching plant producing many small ears, on lateral branches. It is said to grow wild in Mexico, and can be produced by crossing common maize with teosinte. Zea Japonica, an ornamental kind with small flinty grains, cultivated in flower gardens for its striped green and white leaves. Zea hirta is a hairy South American corn, embracing both flint, dent, and pop types. Zea curagua is a form characterised by its serrated leaf edges. Zea ramosa (Gernert), a type with branching ears and highly-branching tassels. A new type from China has been described by Collins as having erect leaf blades with some upper leaves arranged in a monostichous manner, silks developing inside the leaf sheath, and grains with a waxy-like endosperm.

An interesting account of maize as it appeared to the gallant gentlemen who had the honour to subscribe themselves as servants of Sir Walter Raleigh appears in an account by Thomas Heriot, written about 1587, on the commodities that Virginia produced for "victuall and sustenance of man's life usually fed upon by the natural inhabitants."

According to Heriot the natives of Virginia knew the plant under the name of "Pagatowr," which Heriot describes as "a kinde of graine so called by the inhabitants; the same in the West Indies is called mayz. Englishmen call it Guiny wheat or Turkey wheat, according to the countreys from which the like has been brought. The graine is about the bigness of our ordinary English peaze, and not much different in form and shape, but of divers colours—some white, some red, some yellow, and some blew.

"It is a graine of marvellous great increase: of a thousand, fifteen hundred, and some two thousand folde. There are three sorts, of which two are ripe in eleven and twelve weeks at the most, sometimes in tenne, after the time they are set, and are then of height in stalke about six or seven foot. The other sort is ripe in fourteine, and is about tenne foot high; of the stalks some beare foure heads, some three, some one, and some two—every head containing five, six, or seven hundred graines, within a few more or less."

From the above description it would appear that the maize resembling peas would have been of the round or flint type, as the flattened or wrinkled peas were not generally known during the Elizabethan period. The number of weeks to reach maturity and the colours of the grain are also interesting.

The native method of cultivation appears to have astonished these early voyagers, who expressed surprise at finding the land cropped without ploughing or digging. The only work put in appeared to be done a few days before sowing, when the men with wooden tools something in the form of a hoe with long handles, and the women with short peckers used by them when sitting, broke up the upper part of the soil to raise up the weeds, grass, and old cornstalks by the root. After a day or two's drying in the sun these were brought together and burned. At first it was thought that the ashes would be used to improve the ground, but it was noted that in the case where the heaps of ashes were too large they were not spread, nor was any care taken to plant the corn where the ashes lay. The corn was planted in the following manner:—Starting in one corner of the plot with a pecker, they made a hole and put in four grains, taking care that they were about 1 inch apart, and then covered them up with the surrounding soil, and so on throughout the whole plot, which appears to have been planted in rows about a yard apart, and the same distance between the holes in which the corn was planted. The crop was also interspersed with some form of peas and beans, as well as with Macocquer, Melden, and Planta Solis. The first of these (Macocquer), according to Heriot, meant any kind of pumpkin or melon; Melden was probably orache or mountain spinach; and Planta Solis obviously sunflower, which was described as "a great herbe in the forme of a marigolde about sixe foote in height, with the floure a spanne in breadth." In spite of these indifferent methods of cultivation it is recorded that heavy crops were produced. So much were these early settlers impressed with maize that comment was made on the great increase over the heaviest English wheat yield, which they put at 40 (Winchester) bushels to the acre produced by land "fattened with mucke, dung, or any other thing."

If we are to supply our market with its full maize requirements a greater production is necessary, which should come from increased yield per acre rather than from extended area. Farmers would, therefore, do well to pay more attention to maize selection for seed purposes and avail themselves of the selected strains offered by the Queensland Department of Agriculture. Better seeds can do a lot, but even these require the backing of sound cultivation, without which our yearly averages will still be below the economic minimum of yield.

Recent importations have again directed attention to the methods adopted by other countries, for the fixing of standards or grades for commercial grain. The

bases of such standards are the minimum weight per bushel, percentage of moisture, the amount of damaged or cracked corn, also the proportion of foreign material other than maize that the sample contains.

As regards the bushel weight it is well to note that the imperial bushel is larger than the American standard or Winchester bushel. Further, the sale of maize in Queensland is not by measure, but by the unit of 56 lb., which is miscalled a bushel.

Owing to the confusion arising from the misuse of the words indicating measure only, legislation has been passed in the United Kingdom making all sales on the basis of the hundredweight of 112 lb.

The volume weight of maize or other grain is an important factor in the determination of grade, and is best expressed by the actual weight in grammes of the contents of a litre measure. For purposes of comparison, it is well to note that an imperial bushel contains 36.35 litres, and the Winchester bushel 35.24 litres.

In the United States of America one of the accepted methods of moisture test is by the Brown-Duval apparatus, which has been adopted in Queensland as the best for quick determination.

For the purposes of the United States official grain standards the word corn (maize) means shelled grain of the flint or dent varieties, each determination of colour or damage being on the basis of the grain after the removal of foreign material and cracked corn.

The percentages, except in the case of moisture, are percentages ascertained by weight; in the Brown-Duval method the percentage is measured in cubic centimetres. As the weight of one cubic centimetre of water at its maximum density is one gramme, it follows that for all practical purposes the moisture content is given in weight.

Foreign material and cracked maize are defined as kernels or pieces of kernels and all other matter which will pass through a metal sieve perforated with round holes fourteen sixty-fourths of an inch in diameter, and all matter other than maize remaining on such sieve. Damaged grain includes all kernels that have been distinctly injured by heat, fermentation, or other causes.

The colours are divided into white, yellow, and mixed. White consists of maize of which at least 98 per cent. by weight of the kernels are white, a slight tinge of light-straw colour or of pink on kernels otherwise white not affecting the classification as white.

Yellow consists of maize with at least 95 per cent. by weight of yellow kernels, a slight tinge of red on maize otherwise yellow not affecting the classification as yellow.

Mixed consists of maize of various colours not coming within the limits provided for white and yellow.

White, yellow, and mixed corn are divided up into seven grades for each class, the requirements for grade 1 being as follows:—

No. 1.—White, yellow, or mixed.

(*a*) Shall be cool and sweet.

(*b*) Shall have a test weight per Winchester bushel of not less than 55 lb.

(*c*) May not contain more than 14 per cent. of moisture.

(*d*) May not contain more than 2 per cent. of foreign material or cracked corn.

(*e*) May not contain more than 2 per cent. of damaged corn, and no heat-damaged kernels.

The moisture content for grades 2, 3, 4, 5, and 6 are 15.5 per cent., 17.5 per cent., 19.5 per cent., 21.5 per cent., and 23 per cent respectively, the limit of foreign material or cracked corn being 3 per cent., 4 per cent., 5 per cent., 6 per cent., and 7 per cent. The amount of damaged kernels ranges from 4 per cent. in grade 2 to 15 per cent. in grade 6. All maize in grades No. 1 to 5 inclusive must be cool and sweet. No. 6 must be cool but may be musty or sour.

In addition to the above grades is one known as "Sample grade," which consists of any white, yellow, or mixed corn that does not come within the requirements of any of the grades from 1 to 6, or which has any commercially objectionable foreign odour, or is heating, hot, infested with live weevils or other insects injurious to stored grain, or is otherwise of distinctly low quality.

For purposes of the Quarantine and Commerce (Trade Description) Acts, samples of South African maize were taken from the shipments landed at Brisbane. The samples obtained during the month of August have been examined, with the results as set out in the following tables, from which it will be noted that the minimum average and maximum of the several findings are given. With regard to the weight per litre in grammes, it can be taken, roughly, that 800 grammes equals 64 lb. to an imperial bushel. As far as the consumer is concerned the total percentage of sound grain is the most important factor. The importer, however, has the question of the

grains' keeping quality for his first consideration, which matter is determined by the moisture content. Maize fit for long storage should not exceed 13 per cent. in moisture, and be free from insects likely to be injurious to stored grain. Up to the present all the samples examined have been singularly free from weevil attack, and the average moisture content of 13.3 per cent. in the Flint type and 13.8 per cent. in the Dent type is also satisfactory.

TWENTY-SEVEN SAMPLES OF SOUTH AFRICAN MAIZE (FLINT TYPE).

——	Weight of 1 Litre in Grammes.	Percentage of Moisture.	Percentage of Grain of the Type to which the Sample purports to belong.	Percentage of Coloured Grain.	Total Percentage of Sound Commercial Grain.	Percentage of Damaged Grain.	Percentage of Foreign Material.
Minimum ..	742·0	12·3	92·560	·275	94·040	..	·215
Average ..	762·0	13·3	95·106	1·847	96·953	2·486	·561
Maximum ..	797·0	14·2	97·720	6·560	99·720	5·400	1·520
ELEVEN SAMPLES OF SOUTH AFRICAN MAIZE (DENT TYPE).							
Minimum ..	710·0	12·1	93·472	·415	95·110	..	·120
Average ..	729·8	13·8	95·616	2·076	97·692	1·841	·467
Maximum ..	761·0	15·4	99·015	4·620	99·430	4·460	·700

In order to ascertain the feeding value of the different types, representative samples have been analysed by the Agricultural Chemist, Mr. J. C. Brünnich, who reports as follows:—

South African Flint maize—

Minimum crude protein	9.2 per cent.
Average crude protein	9.9 per cent.
Maximum crude protein	10.1 per cent.

South African Dent maize—

Minimum crude protein	9.5 per cent.
Average crude protein	9.8 per cent.
Maximum crude protein	10.1 per cent.

For comparison, analyses of Queensland samples of Dent maize were made, with the following results:—

Queensland-grown Dent maize—

Minimum crude protein	9.3 per cent.
Average crude protein	10.1 per cent.
Maximum crude protein	10.6 per cent.

It is interesting to note that the minimum amount of crude protein was found in a dent variety known as Golden Beauty, and the maximum in the Department's stock of Improved Yellow Dent and Red Hogan.

In the United States a number of experiments have been made in the selection and breeding of maize for a high protein content. After a series of experiments extending over twenty years it has been proved that the average percentage of oil that the maize contains can be greatly increased. That high-protein races may be produced has been shown by Hayes and Garber (1919), who suggest that numerous ears should be self-fertilised and analysed, those that appear of promise being then used and their breeding nature determined by progeny tests. As soon as homologous forms containing the desired characters have been isolated, they may be used as a foundation for the production of an improved strain.

The breeding of maize for a high-protein content may be a counsel of perfection; it remains, nevertheless, one of the matters that should not be lost sight of. In the meantime efforts must be directed to the production of more weight per acre. With the return of normal seasons we may again have a large quantity of maize of our own production for sale, and if the quality is right—that is to say, good samples containing 98 per cent. or more of hard commercial maize with a moisture content of 14 per cent. or less—we shall be able to hold over our crop if so desired, or ship it to any other part of Australia, where a demand exists for good sound corn. Whatever the quantity per acre may be, maize with a high moisture content, or samples containing a large amount of damaged grain or weevils, will not in the long run pay. Quality must be our guide; the best even in maize cannot be too good.

PLATE 70.—SATISFIED WITH QUEENSLAND'S FUTURE—COTTON DELEGATION BACK IN LONDON.

Left to Right.—Hon. J. A. Fihelly (Agent-General for Queensland), Messrs. W. R. Crompton Wood, Mrs. Crompton Wood, Harold Parker, Harding, Armstrong, and T. J. Whittington (Agent-General's Staff).

PLATE 71.—HOW QUEENSLAND FRUITS ARE PACKED.

Plate 72.—A Field Day on a Stanthorpe Soldiers' Settlement—Practical Lessons in Pruning.

Plate 73.—Ex-Diggers, who are doing well on Orchard Lands in the Granite Belt.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations has received the following report (21st September, 1923) from the Assistant to the Entomologist at Meringa (Mr. W. Cottrell-Dormer) on work detailed by the Entomologist in Charge to be carried out during his absence in August at the Pan-Pacific Science Congress.

Tachinid Flies.

Breeding work in this direction has been maintained, sticks with borers having been put in every day, or every second or third day, according to the number of flies counted. The lowest number counted was six on 20th, and until the number increased we devoted our attention more towards getting the Insectary well stocked with grubs. Soon, however, the count went up as follows:—27th, 20; 30th, 30; 31st, 40; 3rd September, 50; 6th, 60 to 70; and as the number grew the supply of borers was increased. At present we are putting in four sticks, about forty borers per day. On 29th August, there being a great number of flies emerging, we were threatened with a serious borer shortage, so I wrote to Mr. Peever, of Babinda, asking him to send bundles as before. Cane was then procured from Mr. Griffen, which was very suitable, as the sticks brought, though they had to be searched for, were badly infested, so now we have plenty of flies, plenty of borers for awhile at least, and good warm breeding weather. The greatest care and attention has been given to this important work, with the result that one small lizard and one small spider are the only enemies which have so far been detected in the cage. During your absence sixty-seven sticks have been put into the cage.

Asilid Larvæ.

There are two kinds of these larvæ at present breeding in the Insectary. They are designated in my descriptions as (A) and (B). There are one of A and thirteen of B at present feeding; others of A died—some of fungus, some inexplicably. The Asilids, Elaterids, and Carabids are all being brought up on frenchi grubs.

Elaterid Larvæ.

We have at present thirty-five of these larvæ feeding in the Insectary, some others have escaped, and one died. Most of these were obtained in company with frenchi in Mr. Beck's horse paddock—a field of weeds—which was being ploughed out.

Carabid Larvæ.

About eight of these were obtained, some injured, but all apparently of the same species; two at least have pupated. These pupæ are being kept aside for description and preservation.

Sulphur.

Earlier experiments were continued; grubs were put with food in soil containing known quantities of sulphur. Up to date no promising results have been obtained.

INTRODUCTION OF PARASITES FROM JAVA.

Batch No. 1.

This first lot of twelve cocoons of Javanese Digger-wasps arrived here on 5th September. They were packed in four tins, which contained cocoons of *Dielis tristis*, one cocoon of *Dielis grossa*, and other cocoons of *Triscolia rubiginosa*.

Dielis tristis.—This tin contained two cocoons, each wrapped in a cylinder of brass wire-gauze, one end being bent in and the other stopped with a small plug of cotton wool. One was a small cocoon and the other large. Both were very light. However, when the cocoon was moved about something could be heard inside the large one, but not in the small one.

Batch No. 2.

This second lot of cocoons of Javanese Digger-wasps arrived here on 7th September. The whole was as dry as could be, and the cocoons, although not showing any signs of mould, did not appear to be healthy, as they are far dryer and lighter than one would expect from a healthy cocoon. The six of *D. tristis* were put together in a large test tube with a wet cotton-wool stopper.

SCENOPINID LARVÆ. (?)

We have found these long active, many-segmented larvæ wherever we have found Tenebrionid larvæ (*Gonocephalum* sp.). One night I had one in a Petri dish with soil

and two or three of the beetle larvæ. Next morning the biggest of the latter was dead, and had a black mark on its side, apparently from a wound. It was healthy when put in dish. The dipterous larvæ has predaceous mouth parts, so it seems likely that it is predaceous on the larvæ of Gonocephalum. At present I have two or three in jars with Gonocephalum larvæ and growing potatoes. Two pupæ have been obtained, but both died from a fungus of some kind. Descriptions were taken of larvæ and pupæ, the latter varying a good deal in size.

Cosmopteryx.

Several efforts were made at breeding this moth and its parasites, and several methods employed, but so far only one moth—a new one—has been obtained. However, we have a good supply of larvæ and pupæ in fluid.

Gonocephalum.

Both beetles and larvæ are fairly plentiful among weeds in canefields. Female beetles were examined and found to be fertile, but the eggs were not yet mature. It is quite likely that these are laid one at a time or in small batches, as the beetle is apparently able to lay a great many eggs. If weeds be uprooted between cane rows the beetles will collect under them, and are thus quite easily obtained. I have had some in a cage for five weeks with food, shade, shelter, and soil, but have not yet obtained eggs. They are very fond of the cut surface of potato tubers and of carrot leaves and cabbage.

ORANGE-TREE BUG *(ONCOSCELIS SULCIVENTRIS).*

The Minister for Agriculture (the Hon. W. N. Gillies) has received from the Government Entomologist (Mr. Henry Tryon) the following report on investigations in connection with the occurrence of the Orange-Tree Bug (Oncoscelis) on the Blackall Range.

In a previous report, dealing with investigations being carried out by the Entomologist's Office with a view to controlling the Orange-tree Bug (*Oncoscelis sulciventris*) so locally prevalent there, and that had been deputed to the Assistant entomologist, Mr. A. A. Girault, it was pointed out that the best method of attack that presented itself appeared to be in efforts at the destruction of the insect when about five days after emergence from the eggs, as I had earlier discovered it transformed into a singular flat leaf-green object difficult of detection.

The bug then, as Mr. Girault had found, could, on banging the tree and its main branches, be brought to the ground, whereupon should the soil beneath it be free from weeds it would invariably crawl back to its trunk to regain its former feeding-grounds amongst the tender growth, and so could be effectively intercepted—say by the use of "tanglefoot" on the tree just above the soil surface; and it was pointed out that systematic concerted action on the part of citrus-growers along these lines would go far to banish its presence in the district.

The officer named has since 18th August been continuing his inquiries, and so testing the efficacy of various contact insecticides for the destruction of the insect by more direct means—that of spraying. In these experiments Mr. Girault has used lime-sulphur, Black Loaf 40, nicotex, kerosene emulsion and resin-kerosene emulsion, the last-mentioned being a tree-wash found the most effective of those tested by the late S. Voller, Instructor in Fruit Culture, and since recommended for the repression of the insect by Mr. A. H. Benson. Of these (except it) none gave any result in bug-destruction, notwithstanding, in the case of the kerosene emulsion, it was used as strong as one part in seven water in one part of the experiments. However, the resin-kerosene-emulsion spray-fluid as recommended only destroyed 50 per cent. of the young insects, whilst with the addition of less kerosene emulsion this percentage was reduced to 30 per cent. Several orange trees were comprised in each of these several tests. Hitherto the experiments had been conducted through the courtesy of Mr. H. Morris at his Birdwood orangery at Flaxton, and were rendered possible through his constant co-operation; but his own efforts long persisted in having so greatly reduced the pest there, is was decided to resume them at a spot near Montville, where the insects had apparently been permitted to breed up and where it was found they occurred in much larger numbers. Latterly, too, Mr. J. H. Simmonds, B.Sc., Entomological Assistant, had been detained to aid in the several undertakings.

At Montville, Mr. A. A. Girault continued spraying experiments, and also had an opportunity of testing the action of cyaniding in killing the young insects as ordinarily employed in destroying scale insects by fumigating. In this work he was assisted by the well-known citrus-grower V. G. Pack, who was perhaps the earliest

to use ''tanglefoot'' in capturing the young bugs following the Entomologist's indications. But the actual cyaniding was carried out by Mr. G. Williams and Mr. R. W. Peters, Instructors in Fruit Culture, acting under the direction of Mr. J. H. Ward of the Fruit Culture Branch.

In one series of four experiments with the cyanide of the strength usually recommended as by Mr. Benson, in which eight trees were used, with the exposures ranging from twenty-five minutes to sixty minutes, it was found that the entire population of young bugs was brought to the ground, and the bugs that afterwards succumbed ranged in number from 73 to 91 per cent. In another series, the trees received three other strengths of ''cyanide,'' in addition to the one ordinarily prescribed, viz., 25 per cent., 50 per cent., and 75 per cent. increases in dosage, the exposures being thirty minutes for the first and twenty minutes for the strongest of the four. In the case of these the fatality reached 93 per cent.

With reference to these experiments with the use of cyanide, Mr. Girault found, strange to remark, that when the bugs on being brought down were kept under observation, in receptacles, all save a small percentage recovered. He therefore concludes that the fatality observed in the orangery is due to exposure (say to sun-heat) supervening on gassing.

The Montville experiments have also included one involving the use of additional contact insecticides in addition to further tests with the resin-kerosene compound mixture. The former have given negative results, the latter (six trees being used) effected the destruction of 24-38 per cent. Further tests are being made. Meanwhile, the insects are passing into a third phase in their life-history in which they are less vulnerable generally.

These investigations, which will be detailed in a special report by Mr. Girault, have indicated two methods by which the Orange Bug may be successfully controlled, each of which might be made to figure in any general concerted action, and such is urgently called for to prevent the infested orangeries proving a serious menace to those free from its presence or nearly so. They have also shown that the insect is to be attacked with greater likelihood of success during the winter and early spring months. Obviously, to treat several orangeries by the fumigation method will involve the possession of a number of gas-proof tents and a gang of men to operate, and the latter applies to some extent to banging the trees and cincturing the trees with ''tanglefoot''; but since, apparently, there is not more than two broods of bugs during the year—generally it seems only one—general procedures of control on the lines indicated must be attended by far-reaching, long-continued benefit.

N.U.P.B.A. ACTIVITIES—BUTTERCUPS AND COMPINES.

At the last meeting of the National Utility Poultry Breeders' Association, Mr. W. F. Lloyd lectured on ''Buttercups and Compines.'' The lecturer traced the origin and evolution of the Buttercup breed, claiming that they were a recognised breed long before the White Leghorn. To-day the American Buttercup Club numbers 1,000 members. The main points to breed for are:—Head, broad and deep; eye, full, round, and prominent; the comb, which gives the bird its name, is very hard to get correctly. It should be cup-shaped, with nice even serrations, fitting firmly on the skull. One spike, not over ¼ of an inch in length, is allowed in the centre. Shoulders and back should be broad, and breast full and carried well forward. Wings, large and well folded against the body; tail also large and well spread. The colour in the male should be a rich brilliant red; beak, dark, and eyes a reddish bay. Neck hackles should be a rich lustrous orange-red. Primary wing feathers should be black with the lower web bay. Breast and fluff bay; tail, black. In the hen, the ground colour should be a beautiful golden buff, barred regularly with black. The tail should be a dull black.

Besides being a very beautiful bird, the Buttercup holds a high position as a utility bird in America, as they have a very small appetite. The lecturer stressed the importance of this point in these days of high priced feeds. He claimed that 136 Buttercups can be fed on the same amount as 100 White Leghorns, and at the same time lay a full-sized marketable egg. Although only a light breed, their frames carry a surprising amount of meat, especially on the breast. In their first attempt at an egg-laying competition they scored 281 and 291 in twelve months.

The lecturer waxed very enthusiastic over the Compines, claiming that they are very hardy, and are the smallest eaters in the poultry world, eating even less than a bantam. Their great utility qualities, combined with their unique colouring, their stamina and sprightliness should win them a prominent place in poultry circles once they become known in Queensland.

Plate 74.—Mareeba's First Motor Lorry (R. Hampe) delivering W. Smallwood's Seed-Cotton at Mareeba Railway Station, July, 1923.

Plate 75.—First Load Seed-Cotton delivered at Mareeba Railway Station by Hastie Brothers, July, 1923.

Plate 76.—Tomatoes Sorted Ready for Packing to the Market.
Grown by Ove Hansen, at Carbeen, near Mareeba, N. Q.

Plate 77.—Pumpkins Grown by Ove Hansen on his Farm at Carbeen, near Mareeba, N. Q. Cotton Growing in the Background.

Plate 78.—"Windermere Bay Kennedy," Champion Draught Stallion, Royal National Exhibition, Brisbane, 1923.

Plate 79.—"Beryl," Champion Draught Mare, Royal National Exhibition, Brisbane, 1923.

PLATE 80.—"POLYBIUS," CHAMPION BLOOD STALLION, ROYAL NATIONAL EXHIBITION, BRISBANE, 1923.

PLATE 81.—JUDGING AYRSHIRES, BRISBANE SHOW, 1923.

Plate 82.—Judging Illawarras, Brisbane Show, 1923.

Plate 83.—Judging Jerseys, Brisbane Show, 1923.

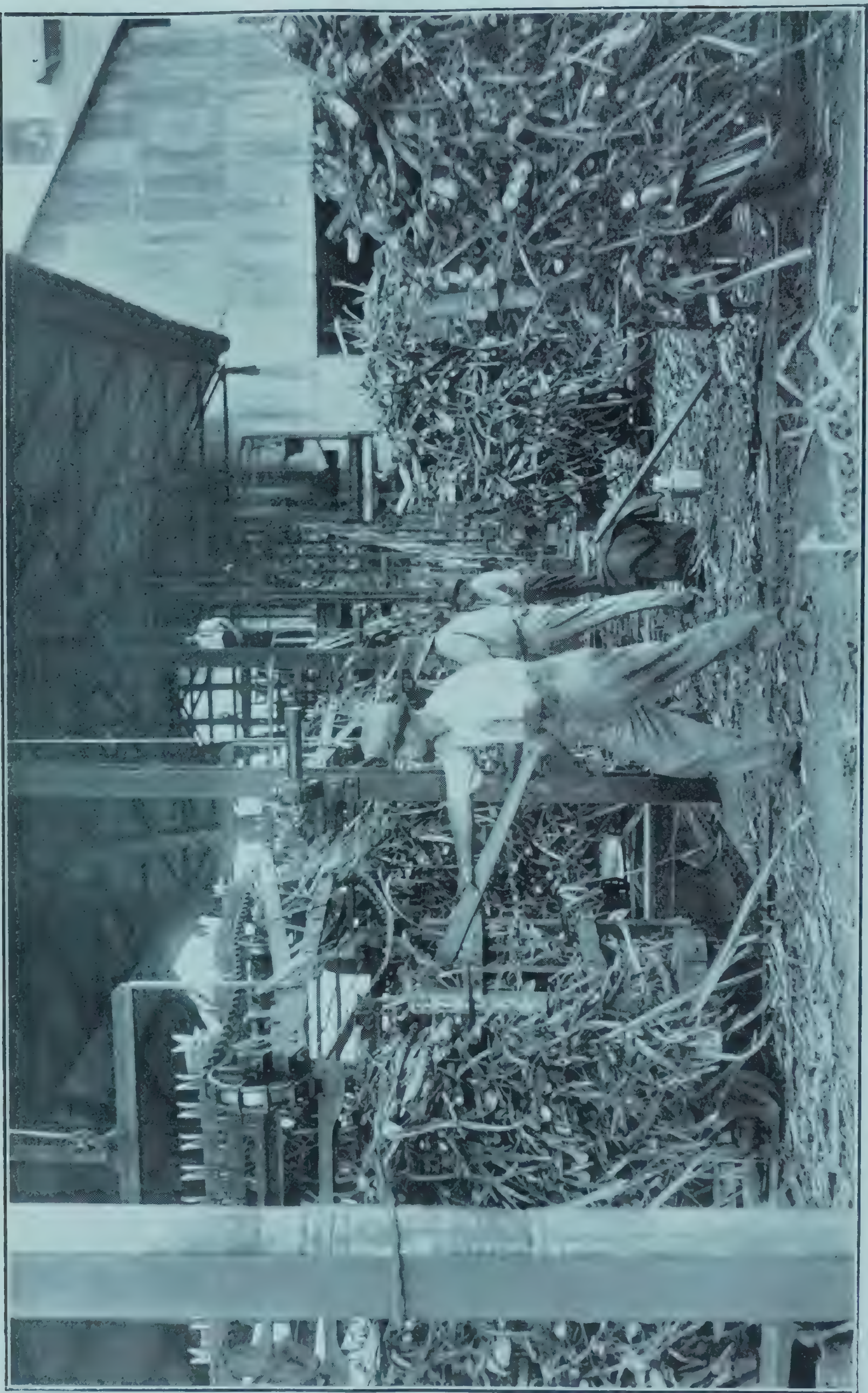


PLATE 84.—FEEDING CANE TO THE CARRIER, SOUTH JOHNSTONE SUGAR MILL.

A SUMMARY OF SOME EXPERIMENTS CARRIED OUT BY THE BUREAU OF SUGAR EXPERIMENT STATIONS.—X.

The Director of Sugar Experiment Stations, Mr. H. T. Easterby, commenced this series in the May (1922) Journal, and in his opening article discussed deep cultivation experiments and tabulated comparative crop result from subsoiled and non-subsoiled fields. The second instalment, an account of results of irrigation experiments and the action of irrigation and manures upon the density and purity of sugar juices, appeared in the June (1922) issue. In the August number Mr. Easterby's notes covered experiments in fertilisation, and were followed in the succeeding issue by an account of distance experiments and resultant crops. In the October (1922) number the summary was continued with notes on the introduction and testing of cane varieties. In the February Journal experiments to determine if cane sets cut from arrowed canes have a prejudicial effect on the germination and subsequent yield were discussed. In his introduction to the Summary of Experiments above mentioned, the Director stated that a summary of the chemical work accomplished by the Bureau, to be prepared by Mr. George R. Patten, formerly Chief Chemist to the Bureau, would also be presented. Mr. Patten has now completed this summary, which entailed a great deal of elaborate work and occupied much time. This is the concluding instalment and the whole summary will shortly be published in bulletin form.—Ed.

MISCELLANEOUS.

Summarised by GEORGE R. PATTEN, Analyst, Agricultural Laboratory, Brisbane, formerly Chief Chemist, Bureau of Sugar Experiment Stations.

The following tables contain some interesting analyses of green manures, sisal hemp, &c., experiment to determine the preserving action of different chemicals upon cane juices, comparative results of analyses made at Racecourse Mill, Mackay, with analyses of juice expressed by the Laboratory Mill at the Sugar Experiment Station, Mackay, from the same varieties of cane, and tests to determine the effect on the quality of the juice by increasing the extraction.

Certain green manures grown at the Bundaberg Sugar Experiment Station were the subject of analyses in the Brisbane Laboratory. The results appear hereunder :—

ANALYSES.

Laboratory No.	Variety.	Moisture.	Organic Matter.	Ash.	Nitrogen.	Phosphoric Acid.	Lime.	Potash
		ANALYSES OF DRY MATERIAL.						
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
148	No. 1 Mauritius Bean	11·11	75·43	13·46	2·248	·52	4·14	1·84
149	No. 2 Mauritius Bean	9·76	78·87	11·37	1·492	·62	3·21	2·46
150	Jerusalem Pea ..	10·98	78·21	10·81	1·730	·42	2·77	1·73
		ANALYSES OF GREEN MATERIAL.						
148	No. 1 Mauritius Bean	77·8	18·84	3·36	·562	·130	1·035	·460
149	No. 2 Mauritius Bean	78·3	18·96	2·74	·360	·149	·774	·592
150	Jerusalem Pea ..	80·0	17·58	2·42	·388	·094	·622	·388

YIELD PER ACRE.

Laboratory No.	Variety.	Tons per Acre. Total Crop.	Tons per Acre. Organic Matter.	Lb. per Acre. Nitrogen.	Lb. per Acre. Phosphoric Acid.	Lb. per Acre. Lime.	Lb. per Acre. Potash.
148	No. 1 Mauritius Bean	13·69	2·58	173	40	317	141
149	No. 2 Mauritius Bean	14·22	2·70	115	47	246	189
150	Jerusalem Pea	12·90	2·67	112	27	180	112

From these analyses it will be seen that the Mauritius bean is superior as a fertiliser to the Jerusalem pea.

23

In the Mackay district, in which the sensitive plant is very common, it has frequently been remarked that where a heavy crop of this plant has been ploughed under a good crop of cane usually follows. Analysis of the sensitive plant have recently been carried out at the Station, while at the same time a new plant stated to be useful as a green manure crop—viz., Mungo Bean—was also analysed. The following table has been prepared by the Mackay Laboratory.

ANALYSES OF MUNGO BEAN AND SENSITIVE PLANT.

Substance.	Moisture	Nitrogen in Green Material.	Ash.	Analysis of Ash.			Calculated on Green Material.		
				Lime.	Potash.	Phosphoric Acid.	Lime.	Potash.	Phosphoric Acid.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Mungo Bean ..	74·892	·4194	10·321	14·511	5·887	1·064	1·405	·569	·1031
Sensitive Plant .. (Mimosa Sensitiva)	61·384	·8240	6·721	6·721	10·276	·7188	2·370	1·527	·1069

Substance.	Calculated in Pounds per Acre on a 15-Ton Crop Basis.				Equivalent to a Manure Dressing of—			
	Lime.	Potash.	Phosphoric Acid.	Nitrogen.	Lime.	Sulphate of Potash.	Superphosphates.	Sulphate of Ammonia.
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Mungo Bean ..	472·08	191·18	34·64	140·91	472·08	382·36	207·84	704·55
Sensitive Plant .. (Mimosa Sensitiva)	796·32	513·07	35·91	276·86	796·32	1026·14	215·46	1384·20

It will be noticed in the above that the percentage of nitrogen is considerably more in the sensitive plant than it is in the Mungo Bean, while the other constituents, such as lime, potash, and phosphoric acid, calculated on green material, are also higher. It is of course not suggested that the sensitive plant or mimosa should be specially grown for green manuring purposes, but those cane farmers who have paddocks overrun with it would probably find the ploughing under of this would materially benefit their land, and enable good cane crops to be realised.

ANALYSIS OF SAWDUST.

Three samples of sawdust were received for analysis with the object of obtaining their value as fertilisers. The results, which are given below, show that, calculated roughly on their unit values, they would only be worth about 5s. per ton, and therefore of little value chemically, though possibly of slightly greater value than this on account of their mechanical effects in restoring humus to the soil. This, however, would not compare with the results of the ploughing-in of a green crop.

ANALYSES OF SAWDUSTS, MAY, 1910.

Constituent.	1	2	3
	Sawdust 3 Years Old.	Sawdust 5 Yerrs Old.	Sawdust over 10 Years.
Mositure	72·155	68·230	73·286
Volatile and organic	26·388	28·730	23·731
Phosphoric acid	·048	·198	·049
Lime	·360	·710	·367
Potash	·037	·061	·077
Nitrogen	·208	·298	·180

SISAL HEMP ANALYSES.

The analyses of the dry substance of the sisal hemp shows that that crop takes up from the soil a relatively high proportion of mineral matter. It is further shown, however, that the great bulk of the mineral matter is composed of soil elements of the commonest and most abundant character, such as lime and magnesia, and that the elements usually purchased, in the form of manures, are drawn upon by the crop in a relatively small measure. The high content of lime and magnesia, in the ash of the sisal, at once explains why the plant flourishes so well upon soils having a coral or limestone subsoil; such, for example, as the sea-level soils of the Hawaiian Islands, where the sisal hemp is considerably developing. There is no doubt, in the opinion of growers, that a good supply of lime and related constituents has a good effect upon the nature of the fibre, as well as upon the rate of growth of the plant.

ANALYSIS OF SISAL HEMP GROWN AT THE EXPERIMENT STATION, MACKAY.

—	Green Substance.	Dry Substance.
Moisture	86·70	00·000
Dry Substance	13·30	100·000
Crude Fibre	2·825	21·240
Total Ash	1·574	11·840
Insol. Ash	·037	·280

ASH CONSTITUENTS.

Sand	·560
Carbon Dioxide	26·430
Soluble Silica	·808
Phosphoric Acid	4·604
Lime	31·860
Magnesia	21·310
Ferric Oxide	·800
Manganese Oxide	·000
Sulphur Trioxide	1·448
Chlorine	1·040
Potash	7·997
Soda	2·674
	99·531

EXPERIMENTS TO DETERMINE THE PRESERVING ACTION OF DIFFERENT CHEMICALS UPON CANE JUICE.

Original Analysis.		Lead Acetate.			Mercuric Chloride.			Formalin.		
	Per Cent.	After 16 hours.	After 40 hours.	After 72 hours.	After 16 hours.	After 40 hours.	After 72 hours.	After 16 hours.	After 40 hours.	After 72 hours.
Brix,	19·410	..	..	..	19·380	19·330	19·320	19·380	19·360	19·320
Sucrose,	18·157	18·321	18·239	18·232	18·163	18·183	18·135	17·960	17·892	17·829
Glucose,	·249	·253	·250	·250	·253	·265	·277	·285	·322	·323
Purity,	93·590	..	..	..	93·820	94·060	93·960	92·670	92·410	92·280

NOTE.—The above figures show the preserving action of lead acetate, mercuric chloride, and formalin. The results individually, and in average, indicate conclusively that mercuric chloride is the most effective. These results relate exclusively to preservation, and not to the clarification of juice for analysis. Lead acetate was applied as a preservative at the rate of 4 c.c. to 100 c.c. of juice; mercuric chloride at the rate of ·01 gramme to 100 c.c. of juice; and formalin at the rate of 1 c.c. to 100 c.c. of juice.

Comparative Results of Analyses made at Racecourse Mill with Analyses of Juice expressed by the Laboratory Mill at the Sugar Experiment Station, Mackay, from the same Varieties of Cane.

In order to get some information as to the average difference between the juice expressed at the first rollers of a large sugar mill and juice expressed by a laboratory mill from the same varieties of cane, a large number of samples have been compared. The laboratory mill at this station is a powerful one, having rollers of 6¾ inches diameter, which can be adjusted to crush light or heavy. The analyses given in the accompanying table under laboratory mill results are the final analyses made on the experiment varieties under test. The samples varied in weight from about 28 lb. to 150 lb. of cane, and were only passed through the rollers once. The probable extraction would be between 25 per cent. and 35 per cent. ; by crushing the cane twice an extraction of 51 per cent. can be obtained, and the maximum is approximately 72 per cent., which was obtained by passing the cane through five or six times. The samples taken at Racecourse Mill were from the same varieties off the same divisions of land. The cane was harvested, and the analyses were made at Racecourse Mill within about five days of the time the tests were made at the station. The greatest difference between any two results is 1·74 C.C.S., and no other differences exceeded 1·0 per cent. These wide variations are, no doubt, due to slight differences of sample, and the same applies to the four instances where the mill results are slightly higher than the laboratory results. The average difference of thirty-four samples is ·47 per cent., and this completely bears out the previous experiments as published in the 1920 report, where the same canes were crushed six times and each sample of juice collected and analysed separately. The 1920 experiment showed that the cane juice does not vary greatly with increased extraction, and the true average c.c.s. was only slightly lower than that of the first juice expressed. It should also be noted that in the 1920 experiments the extractions of the final crushings and the weight of juice expressed were low as compared with the total juice.

Comparative Results of Analyses Made at Racecourse Mill, with Analyses Made of Juice expressed by Laboratory Mill from the Same Varieties of Cane.

Variety	Laboratory Mill Results.				Racecourse Mill Results.				Difference in C.C.S.
	Per cent. Total Solids (Brix).	Per cent. Sucrose in Juice.	Per cent. C.C.S. in Cane.	Purity of Juice.	Per cent. Total Solids (Brix).	Per cent. Sucrose in Juice.	Per cent. C.C.S. in Cane.	Purity of Juice.	
Q. 970 (first ratoons) ..	21·9	20·61	16·15	94·1	21·1	20·05	15·8	95·0	·35
Q. 970 (first ratoons) ..	21·7	20·50	16·10	94·5	21·4	19·75	15·3	92·3	·80
Q. 970 (first ratoons) ..	21·6	20·23	15·81	93·6	21·0	20·0	15·78	95·2	·03
Q. 970 (first ratoons) ..	21·9	20·26	15·72	92·5	21·2	19·85	15·47	93·6	·25
Q. 1098 (plant) ..	19·5	18·21	14·56	93·4	19·0	17·48	13·85	92·0	·71
7 R. 428 (plant) ..	19·1	17·58	13·95	92·0	18·8	17·19	13·57	91·4	·38
Q. 1121 (plant) ..	19·6	18·47	14·84	94·2	19·9	18·5	14·75	92·9	·09
Q. 813 (plant)	21·3	19·97	15·81	93·7	21·1	19·74	15·60	93·5	·21
N.G. 24A (Goru) ..	19·6	18·13	14·68	92·5	20·2	18·44	14·3	91·3	·38
Shahjahanpur	20·6	19·37	14·22	94·0	20·9	19·11	13·79	91·4	·43
H.Q. 77 (plant) ..	19·6	18·61	14·93	94·9	19·7	18·27	14·55	92·8	·38
M. 168⁰⁴ (plant) ..	18·4	16·84	13·3	91·5	18·5	16·48	12·71	89·1	·59
Java E.K. 28 (plant) ..	20·8	19·89	15·83	95·6	22·4	20·25	15·58	90·4	·25
Java E.K. 2 (plant) ..	16·8	14·71	11·03	87·5	18·0	15·45	11·44	85·8	·31
Java E.K. 1 (plant) ..	18·6	16·87	12·86	90·7	18·3	17·12	13·26	93·5	higher ·40
Java 247 (plant) ..	18·8	18·0	13·67	95·7	19·3	17·55	12·9	90·9	higher ·77
Java 100 Bont (plant)	17·8	15·95	12·22	89·6	18·5	16·03	12·0	86·6	·22
H. 109 (plant)	19·3	18·64	14·73	96·5	20·75	19·26	14·88	93·0	·15
H. 146 (plant)	19·5	18·61	14·97	95·4	20·2	18·10	14·05	89·6	higher ·92
H. 227 (plant)	19·7	18·61	14·89	94·4	20·0	17·97	14·13	89·8	·76
D. 1457 (first ratoons)	21·2	20·01	16·48	94·4	21·8	19·69	15·78	90·3	·70
D. 109 (first ratoons) ..	19·2	18·11	14·47	94·3	18·9	16·64	12·73	88·0	1·74
B. 4596 (first ratoons)	17·5	16·19	12·49	92·5	17·8	16·01	12·12	90·0	·37
B. 6450 (first ratoons)	20·4	19·63	15·58	96·2	20·4	19·44	15·33	95·3	·25
Gingor (first ratoons) ..	20·3	19·36	15·76	95·3	..	..	15·05	..	·71
7 R. 428 (first ratoons)	20·2	18·62	14·6	92·2	..	..	14·40	..	·20
H.Q. 458 (first ratoons)	19·9	18·59	15·13	93·4	..	..	15·65	..	·52
Q. 813 (first ratoons) ..	21·8	21·1	17·0	96·8	..	..	16·0	..	higher 1·0
Q. 903 (first ratoons) ..	20·5	19·74	15·67	96·3	..	..	14·9	..	·77
Q. 1098 (first ratoons)	20·6	19·59	15·54	95·1	..	..	14·6	..	·94
Q. 1121 (first ratoons)	20·7	20·03	15·94	96·7	..	..	15·2	..	·74
Q. 970 (first ratoons) ..	21·3	20·41	16·26	96·1	..	..	15·7	..	·56
N.G. 24B Goru (second ratoons)	20·4	19·26	15·50	94·4	..	..	14·8	..	·70
N.G. 24B Goru (second ratoons	21·4	19·92	15·61	93·0	..	..	14·8	..	·81
Average C.C.S. 34 samples ..	..	..	14·88	..	Average	C.C.S.	14·41	Average	·47

TESTS TO DETERMINE THE EFFECT ON THE QUALITY OF JUICE BY INCREASING THE EXTRACTION.

Variety of Cane.	Percentage of Juice Expressed on 100 of Juice.		Total Solids (Brix).	Per cent. Sucrose in Juice	C.C.S. in Cane.	Purity of Juice.
N.G. 24B (Plant)	First crushing ..	16·09	19·3	17·74	14·06	91·9
Ditto	Second crushing ..	24·42	19·1	17·52	13·86	91·7
Ditto	Third crushing ..	14·37	19·2	17·63	13·95	91·8
Ditto	Fourth crushing ..	8·62	19·8	18·20	14·41	91·9
Ditto	Fifth crushing ..	5·75	19·6	17·30	13·37	88·3
Ditto	Sixth crushing ..	1·15	20·3	17·70	13·57	87·2
Total Extraction		70·40	..	..	..	..
True Average C.C.S. in Cane		..	..	..	13·95	..
N.G. 24A (First Ratoons) ..	First crushing ..	5·21	20·3	18·99	15·02	93·5
Ditto	Second crushing ..	19·03	19·9	18·77	14·90	94·3
Ditto	Third crushing ..	19·03	19·9	18·75	14·89	94·2
Ditto	Fourth crushing ..	14·60	19·8	18·65	14·80	94·2
Ditto	Fifth crushing ..	10·69	20·4	18·88	14·84	92·5
Ditto	Sixth crushing ..	3·12	20·4	18·72	14·63	91·8
Total Extraction		71·68	..	..	..	..
True Average C.C.S. in Cane		..	..	..	14·86	..
H.Q. 426 (First Ratoons) ..	First crushing ..	5·66	21·6	20·26	16·23	93·7
Ditto	Second crushing ..	10·86	21·1	19·52	15·52	92·5
Ditto	Third crushing ..	16·98	21·1	19·49	15·48	92·4
Ditto	Fourth crushing ..	12·27	21·0	19·41	15·42	92·4
Ditto	Fifth crushing ..	6·61	21·2	19·41	15·34	91·5
Ditto	Sixth crushing ..	5·66	21·6	19·66	15·48	91·0
Total Extraction		58·04	..	..	..	..
True Average C.C.S. in Cane		..	..	..	15·53	..

Mr. Keogh, chemist in charge of the Mackay Station, comments :—In the preceding tables the percentage of juice expressed is the amount expressed at each crushing. In the first crushing the rollers were well opened and the cane only lightly cracked ; the second crushing the rollers were screwed down lower and the cane crushed lightly ; the third time the rollers were screwed well down and the cane got a good crushing ; the fourth time the rollers were almost down as far as possible ; the fifth, the rollers were the same as the previous time, but the cane was put through one stick on top of another ; and the final crushing the rollers were screwed down as far as possible, and two sticks were put through at a time one on top of another. In the first and second tables the extraction is shown as 70·4 and 71·68 respectively, in each case no more juice could be expressed, and the maximum extraction on the laboratory rollers was obtained without maceration. At each crushing the juice was weighed, well mixed, and a sample taken for analysis. With the Clark's Seedling, the extraction obtained was not very high ; owing to the brittle nature of the cane it broke up into very small pieces. It will be noticed that the juice from the first three crushings is only slightly higher than the true average c.c.s., and that from the final crushings is slightly lower. For the first sample 97 lb. of cane were taken, the second sample 54¼ lb., and the third sample 59½ lb. of cane.

2. The second experiment was the comparison of the analysis of laboratory mill juice with juice from the same variety and field crushed by the first mill of a large sugar factory.

FURTHER COMPARATIVE RESULTS OF ANALYSES OF JUICE FROM LABORATORY MILL AND JUICE FROM FIRST MILL OF SUGAR FACTORY.

Variety of Cane.	Laboratory Mill Results.				First Rollers of Sugar Mill.			
	Total Soluble Solids (Brix).	Sucrose in Juice.	Quotient of Purity.	C.C.S. in Cane.	Total Soluble Solids (Brix).	Sucrose in Juice.	Quotient of Purity.	C.C.S. in Cane.
Q. 1092 (Plant)	18·7	16·37	87·5	12·59	18·6	16·27	87·4	12·48
H.Q. 458 (Plant)	18·9	16·61	87·8	12·80	19·17	17·13	89·3	13·37
H.Q. 458 (First Ratoons)	19·4	17·38	89·6	13·55	20·06	17·56	87·5	13·50
Q. 1121 (First Ratoons) ..	20·0	18·61	93·0	14·80	19·17	17·40	90·7	13·70
N.G. 24B (Plant—Goru) ..	19·2	17·63	91·8	13·95	19·47	17·37	89·2	13·51
Average C.C.S. ..	..	..	..	13·54	Average C.C.S. ..		..	13·31

In the above tests the cane for the laboratory sample was picked from the field after the cane was cut for sending to the mill. In all cases twenty average-sized

sticks were selected, and the cane passed through the rollers twice ; the first crushing was light, and in the second the rollers were screwed well down ; the crushings as given to these samples would express about 40 per cent. of the juice ; the maximum extraction obtainable on this small mill is approximately 72 per cent. ; this was determined by actual tests in another set of experiments.

The tests of the sugar-mill were made on the same varieties and on the same cane from which the small samples of twenty sticks were selected. The cane was loaded into wagons after the small samples were selected, and then sent to Racecourse Mill, where the wagon loads were passed through the first rollers and the samples taken for comparison.

[THE END.]

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF AUGUST, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING AUGUST, 1923 AND 1922, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Aug.,	No. of Years' Re-cords.	Aug., 1923.	Aug., 1922.
North Coast.	In.		In.	In.
Atherton	0·86	22	0·20	0·13
Cairns	1·78	41	0·76	0·54
Cardwell	1·32	51	1·21	0·18
Cooktown	1·37	47	0·14	0·24
Herberton	0·68	36	0·25	0·12
Ingham	1·40	31	2·20	0·10
Innisfail	5·28	42	3·35	1·53
Mossman	1·33	15	0·28	0·85
Townsville	0·47	52	1·69	...
Central Coast.				
Ayr	0·54	36	1·02	...
Bowen	0·71	52	0·51	...
Charters Towers ...	0·53	41	1·12	...
Mackay	1·06	52	1·22	0·02
Proserpine	1·36	20	1·36	...
St. Lawrence ...	0·91	52	0·88	...
South Coast.				
Biggenden	1·20	24	0·15	0·49
Bundaberg	1·40	40	0·80	1·10
Brisbane	2·12	72	0·70	0·16
Childers	1·33	28	0·26	2·03
Crohamhurst ...	2·32	30	1·35	1·18
Esk	1·59	36	0·41	0·52
Gayndah	1·25	52	0·32	0·51
Gympie	1·85	53	0.83	0·15
Glasshouse Mts. ...	1·61	15	*	0·87
Kilkivan	1·58	44	0·37	0·71
Maryborough ...	1·73	52	0·76	0·45

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Aug.,	No. of Years' Re-cords.	Aug., 1923.	Aug., 1922.
South Coast—continued:	In.		In.	In.
Nambour	1·99	27	1·29	0·77
Nanango	1·45	41	0·56	0·58
Rockhampton ...	0·90	52	0·21	0·73
Woodford	1·86	36	0·90	0·58
Darling Downs.				
Dalby	1·24	53	0·35	0·36
Emu Vale	1·20	27	0·85	0·46
Jimbour	1·30	35	0·30	0·35
Miles	1·21	38	0·33	..
Stanthorpe ...	1·85	50	0·25	0·54
Toowoomba ...	1·77	51	0·59	0·49
Warwick	1·56	58	1·08	0·50
Maranoa.				
Roma	0·97	49	0·02	...
State Farms, &c.				
Bungeworgorai ...	0·89	9	0·01	...
Gatton College ...	1.21	24	0·39	0·21
Gindie	0·79	24	1·67	...
Hermitage ...	1·40	17	0·55	0·49
Kairi	1·09	9	0·48	0.18
Sugar Experiment Station, Mackay	0·95	26	0·90	0·05
Warren	1·10	9	0·12	0·60

* Return not received.

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for August this year, and for the same period of 1922, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Government Meteorologist.

SUGAR: FIELD REPORTS.

The Northern Field Assistant to the Bureau of Sugar Experiment Stations reports (20th September, 1923) to the Director, Mr. H. T. Easterby, as follows:—

Mossman.

Messrs. Crees Brothers' Farm.—The canes analysed were twelve months old, and the samples taken were from single, although not picked, sticks.

Variety.	Length.	Weight.	Per cent. C.C.S.	Lbs. C.C.S. in Stick.	Tons Cane per Ton, Sugar.
	Ft. in.	Lbs.			
H.Q. 458	10 0	10	12·88	1·288	8·62
D. 1135	10 0	5	8·42	..	..
H.Q. 1	6 6	6½	11·40	·7410	9·74
Nanemo	6 0	3½	16·70	·5845	6·65
H. 109	10 0	6	12·03	·7218	9·23
Badila	5 3	6	16·70	1·002	6·65
Q. 903	7 0	5	15·20	·760	7·30
E.K. 28	9 0	6¾	14·97	1·0105	7·42
E.K. 1	12 3	8	11·63	·9304	9·54
Oramboo	7 3	5½	16·57	·9113	6·69
B. 147	7 0	7	13·23	·9261	8·39

When the samples were taken very little arrowing had developed. Probably the density will further improve when the final analysis is taken at cutting time.

Cairns.

The very dry conditions so lately prevailing here changed for the better to a small extent on the 18th August, when showers varying from very light at Redlynch and Freshwater to half an inch in Cairns, and increasing to about 2 inches in the Babinda areas were experienced. Although these are small amounts, they will be of much benefit, helping ratooning and planting operations, besides freshening up the pasturage in the area.

Proserpine.

In this centre extremely cold and dry conditions were experienced during the past winter. Rainfall up to the end of August amounted to only 23.25 inches, as against the average annual fall of over 76 inches. Severe frosts were also recorded. The mill was working satisfactorily. Owing to the dry weather and then the frost, density was under the average and fluctuations were more marked than usual. The tramline (about 6 miles in length) connecting the Banana Pocket with the Government railway at Thompson's Creek was finished and was being used by local growers. At present it is a horse line, but with the full area under crop a locomotive will probably be employed.

The cane in general looked very well and rather freer from frost effects than most of the other areas visited. Some extremely good Goru (N.G.24, 24A, and 24B), Badila, and Q.813 were noticed. Some 200 acres of land should be supplying the mill in 1924.

Cannon Valley, Strathdickie, and Saltwater did not show the effects of the frost nearly as much as the area nearer the township, and some very fine cane was seen around these centres, practically untouched by frost. D.1135 and Q.813 seem to have stood the frost better than the other varieties.

New Areas.—One of these is Bloomsbury, on the Mackay Railway Line, where some 60 acres of good land will be under crop for next year. Nearer the mill and upon land situated, say, roughly, between Myrtle Creek, the river, and Foxdale, several new blocks have also been planted.

Throughout all the Proserpine area a large acreage of land is now under cane, and, despite the dry conditions, a fair strike seems assured. As a whole, conditions in this district are improving rapidly. Cultivation methods are sound, and fertilising is being carried out to a large extent. Lime has been successfully used by several of the growers. Quite a number of soil analyses were sent away to the Sugar Bureau lately, and the senders intend following out the advice given.

Four or five new tractors are in use, and several more are on order. As usual, growers using them speak very highly of the time and labour saved.

Quite a number of new houses were noticed in and adjacent to the town, and, as the latter is now connected with various outlying parts of the area by really good roads, it looks as if the advent of the through line from Mackay and the return of good seasons will make Proserpine a busy centre.

Bowen.

This district was also suffering from a very dry time. Up to the end of August the rain registration amounted to only 7.89 inches, as against the average rainfall of 40 inches. Naturally crop conditions have been bad, and in nearly all cases the cane being harvested has been irrigated by small plants not big enough to keep up the water supply needed by growing cane, especially when the ground has not had a soaking for such a very long period. Considering this it is really remarkable that the cane going into the mill is as good as it is. Among the cane being cut was noticed very good N.G.24 and N.G.24B (Red and Green Goru), Badila, Q.855, Q.813, and D.1135. Some of the Q.855 were first ratoons and looked really good.

Several growers have limed and fertilised their fields.

The Northern Field Assistant, Mr. E. H. Osborn, reports under date 29th August, 1923:—

Mulgrave.

Among some of the newer cane areas is that known as the Little Mulgrave. This locality shows much progress since my last visit. Further areas are being fallen. The Main Roads Board are now engaged on the road to connect with the Tableland, and much traffic is now to be seen upon the road known as the Packers' Track.

A new and important innovation in connection with this increased traffic is a particularly fine 5-ton motor lorry, which negotiates the very broken and hilly country over which the road goes quite easily. On the morning of my visit three large sawmill logs containing probably about 1.500 superficial feet were delivered in Gordonvale at 8.30 a.m. After delivering same and loading with eighteen casks of cement and other goods, it overtook me 5 miles from Gordonvale at 10.15 a.m. When one sees the great ease and rapidity with which it negotiates such roads, it makes the idea of motor trollies rather attractive for cane harvesting where rails are not in use.

Another new cane area for the Mulgrave Mill is on the Mulgrave River. It contains from 250 to 350 acres of first-class deep alluvial flats; planted upon it are some 230 acres carrying a heavy crop of Badila. Messrs. Jackson and Company, the owners of this property, have spent about £1,000 in constructing a very fine bridge, 320 feet in length, across the river over which the locomotives run, and they are now building two more smaller ones to take locomotive traffic across deep gullies in their cane paddocks. Messrs. Jackson and Company have about 110 acres under the plough. Of this, some September plant shows about 4 feet of solid cane, whilst the twelve months' old plant is cutting at about 35 to 40 tons per acre. As a canegrowing proposition the property is an excellent one. New farms are also being opened up between the mill and the packers' camp. Here there are some 24 acres (D.1135) planted last September and manured with about 6 cwt. mixed manure. Despite its being forest land and the very dry season, the paddock should cut at the rate of at least 25 tons per acre.

Diseases and Pests.—Symptoms of "leaf scald" were observed, principally in H.Q.426 (Clark's Seedling), Green Goru (24B), and also in Badila. D.1135 so far seems resistant. Probably the very dry weather conditions now being experienced are partly responsible.

Advantage was taken of Mr. McBryde's (mill chemist) courtesy to inspect the experimental plot at the mill that he has initiated in connection with this disease. Mr. McBryde has taken a great deal of trouble, and his experiments are very interesting, although only a couple of months old. The ground chosen has been well worked and watered when necessary. When inspected the conditions were good for growth, the soil being loose, moist, and fairly warm.

In the plot are healthy picked plants, plants from healthy looking sticks but from slightly affected stools, plants taken from sticks showing slight signs of disease, and plants inoculated by being placed in contact with diseased sets. The canes chosen were H.Q.426, N.G.15, 7 R.428, and D.1135.

Of these plants the first mentioned (*i.e.*, the picked ones) appear splendidly green and healthy looking, and compare more than favourably with outside plants

put in at the same time, but the majority of all the others show symptoms of the disease in a more or less marked extent. The experiment as an object lesson is well worth studying by local growers. Although grubs have done a certain amount of damage this year, the dry weather must also be allowed for, and it is probable that the direct grub damage this season is considerably less than last year. The experiments with para-dichlor. now being conducted by Mr. Jarvis are most promising.

Hambledon.

A certain amount of "yellowing" of the tops is very noticeable amongst the cane, more especially in the Badila.

Among different parts of the area Freshwater certainly shows most promise. Considering how very dry the weather has been, some very fine cane (Badila) twelve months old was seen in several places, and a return of 40 tons per acre was fairly usual. The first ratoons were also cutting very well. Messrs. McManis and Painter have some 110 acres for this year, and hope to increase this amount largely for next year. These growers are developing their area in a very large way. Further up the creek some fine cane was seen at Messrs. O'Hara's and several other places.

Diseases.—The conditions of the Hambledon crop are somewhat similar to those of the Mulgrave area. Leaf scald was noticed in a number of places, and rather to a larger extent on the newer and richer lands.

Grubs.—Although probably the total amount of damage caused by grubs this year is less than other years, yet in individual places the loss has been very severe, notably from, say, north of Mr. G. Hing's farm to the Freshwater Gap.

New Varieties.—Mr. F. C. Curlewis gave some interesting figures from an experimental paddock on his farm. This land has been under cane for a very large number of years, and this year the particular plot was grub-affected.

YEAR 1922. 11 Months Old.	C.C.S.	YEAR 1923. 14 Months old. No. of Sticks.	Average Length.	Average Weight.	C.C.S.
			Ft. in.	Lb.	
E.K. 28	14·09	4	8 0	8	15·1
Badila	..	3	5 8	6	15·1
H. 109	11·56	4	8 7	8	13·0
Q. 695	10·91	3	6 2	6	12·1

Other canes planted in the same block were M.16804, H.Q.77, H.Q.458, and Oba Badila, but the canes listed above gave the best results.

Mr. Curlewis is planting out a large area of E.K.28 for next year, as he considers that its tonnage per acre in such an unfavourable year, its high sugar content, and its comparative freedom from grubs in this case make it a good cane to try out on a larger scale.

Mossman.

Very dry weather conditions were also in force in this area. The mill had just started, the density being very fair. The supply was being well maintained, and with the exception of dry conditions everything looked promising for a successful season.

A large cropping of young plant was noticed throughout the district, and, considering the lack of moisture, it looked remarkably well. In this respect Messrs. Pringle Brothers and Mr. G. Muntz have really good blocks.

Respecting the newer varieties, some very interesting work has been carried out by Messrs. Crees Brothers, as follows:—

CANE TWELVE MONTHS OLD.

E.K.28—Erect nature, good stools and length of cane, cutting probably 40 tons to the acre.

E.K.1—Very heavy crop, some sticks up to 13 feet in length, but rather inclined to lie down. Very healthy-looking.

Q.903—Very good stools and length of cane; will cut fairly well.

H.Q.458—Very heavy sticks, medium number of same.

H.109—Thin, long, and straggly-looking and showing signs of leaf disease. Would not advise planting out same.

THE WANGANELLA TYPE OF SHEEP.

BY W. G. BROWN, Sheep and Wool Expert.

The greatest asset of Australia to-day is the pastoral industry, returning forty-six millions of pounds sterling every year in wool values alone. The greatest asset again to the sheepbreeder and the woolgrower is the ''Wanganella'' type of sheep. This type is now to be found in all parts of Australia where hardiness under almost any conditions of climate is desired. Besides, they give a fleece which for quality, weight, and value per head is not excelled, if equalled, by any other breed in the world. South African breeders are raising the value of their flocks by means, almost exclusively, of the use of this blood. They have paid as high as 4,000 guineas for Australian rams. A most instructive set of pictures, reproduced from the ''New Zealand Farmer,'' appears in the issue of the ''Stock and Station Journal'' of 1st August, and are reproduced here.

The first two plates are those of direct lineal descendants of the first merino flock established at Camden Park, New South Wales. They have been kept pure.

PLATE 85.—A TYPICAL CAMDEN PARK RAM.

Nowadays they would not be used in any flock, yet they were the foundation sheep of our great pastoral business.

In the late fifties Messrs. Pippin Brothers brought a flock of merinos to Wanganella from Victoria. They selected 100 ewes nearly pure Rambouillet, and had the good fortune to purchase in Sydney an imported French Rambouillet ram, called Emperor. (See plate.) From this ram is descended most of the splendid sheep to be found in Queensland and New South Wales flocks. A further accession to the Wanganella stud was two rams, imported by Messrs. Pippin in 1864. These rams were sons of ''Old Grimes,'' a noted American ram, son of ''Golden Drop,'' a ram for which its owners, Messrs. Hammond, refused 25,000 dollars. These two rams mixed beautifully with the Emperor blood, and the result is the present-day Wanganella. One celebrated sheep of the breed is pictured on one of the accompanying plates. His likeness to his famous ancestor of nearly seventy years ago is astonishing. Since the American sheep were imported and used there has been no outcross in the blood. The Camden flock and its descendants have been kept for sentimental reasons. They breed within themselves quite freely—as freely as any other flock.

PLATE 86.—A TRIO OF CAMDEN PARK MERINOS.

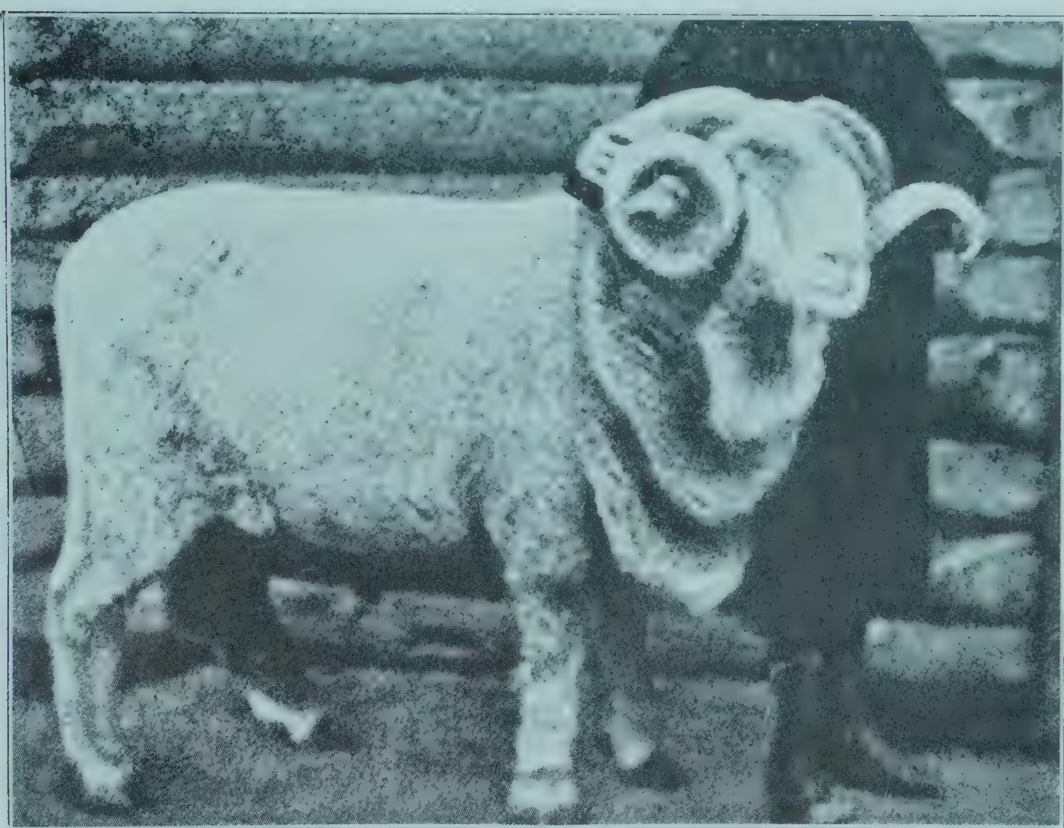


PLATE 87.—PIPPIN'S FAMOUS RAM, "EMPEROR."

Plate 88.—The Big-bodied, Square-framed, Open-faced Merino of To-day.
A lineal descendant of "Emperor," of Wanganella fame.

A QUEENSLAND BUTTER POOL.

A notice advising the intention of His Excellency the Governor in Council to create a Butter Pool, which will apply to all factory butter produced within the State for twelve months from the date of the Order actually constituting the Pool, has been gazetted.

The Board to administer the Pool will consist of five elected by the Butter Factories in each of the following divisions:—

No. 1—The Butter Factories at Atherton, Malanda, Charters Towers, Bundaberg, Wowan, Rockhampton, Gladstone, Rockhampton and Mount Molloy, N.Q.

No. 2—The Butter Factories at Gayndah, Biggenden, Kingaroy, Maryborough, Mundubbera, Nanango, Murgon, Cooroy, and Gympie.

No. 3—The Butter Factories at Chinchilla, Clifton, Dalby, Miles, Toowoomba, Crow's Nest, Goombungee, Oakey, and Roma.

No. 4—The Butter Factories at Killarney, North Ipswich, Ipswich, Booval, Boonah, Grantham, Laidley, Allora, Goondiwindi, Mill Hill (Warwick), and Texas.

No. 5—The Butter Factories at Caboolture, Pomona, Eumundi, Esk, Kin Kin, Beaudesert, Maleny, Kingston, Woodford, Dayboro'.

In the event of a referendum being held to decide whether the Butter Pool should be constituted or not, votes will be given to butter manufacturers, and also to all persons who have supplied cream to butter factories at any time during the past twelve months.

Any petition asking for a poll to decide whether the Pool shall be constituted should reach the Under Secretary, Department of Agriculture and Stock, not later than the 12th November, 1923.

Nominations for seats on the Board will be received up to 5th November.

THE DAIRY HERD—QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

Milking Records for August, 1923.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Prim	Friesian	4 April, 1923	960	3·2	35·70	
Miss Security ..	Ayrshire	8 June, 1923	750	3·9	34·20	
College Grandeur	Jersey ..	11 July, 1923	480	5·3	30·	
Bellona	Ayrshire	3 Aug., 1923	638	3·8	28·42	
College Cold Iron	Jersey ..	23 April, 1923	480	4·9	27·60	
Lady Meg ..	Ayrshire	14 July, 1923	570	3·8	25·50	
Soprano ..	,, ..	14 June, 1923	480	4·6	24·30	
Comedienne ..	Jersey ..	11 July, 1923	480	4·6	24·30	
College Prima Donna	Friesian	19 Mar., 1923	570	3·5	23·10	
College Ma Petite	Jersey ..	12 June, 1923	450	4·4	23·10	
Pretty Damsel ..	Ayrshire	11 July, 1923	450	4·3	22·50	
Rainfall of Marinya	,, ..	29 Mar., 1923	510	3·7	21·90	
Charming Damsel	,, ..	27 April, 1923	480	3·9	21·90	
College Desire ..	,, ..	12 July, 1923	450	4·1	21·60	
College Evening Glow	Jersey ..	5 April, 1923	390	7·1	21·30	
Lute	Ayrshire	26 April, 1923	480	3·8	21·30	
College St. Martha	Jersey ..	25 June, 1923	360	5·	21·	
Lady Loch II. ..	Ayrshire	20 April, 1923	420	3·7	20·70	
Snowflake ..	Shorthorn	17 April, 1923	480	3·6	20·10	

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, AUGUST, 1923.

The first part of August was rather bleak, with prevailing westerly winds, but the month finished with finer weather, which set the birds to work in earnest. In the light section the highest scores were: C. H. Singer, 154; W. and G. W. Hindes, 150; N. A. Singer, 150. In the heavy breeds R. Burns with 152 and James Ferguson with 144 scored best. Mr. J. M. Manson's "B" bird died of peritonitis; this is the first death during the term. Scores:—

Competitors.	Breed.	August.	Total.
	LIGHT BREEDS.		
*C. H. Singer	White Leghorns	154	631
*W. and G. W. Hindes	Do.	150	600
*N. A. Singer	Do.	150	605
*S. L. Grenier	Do.	134	559
*Ancona Club	Anconas	134	558
*Oakleigh Poultry Farm	White Leghorns	137	553
*Rock View Poultry Farm	Do.	120	523
*Beckley Poultry Farm	Do.	132	522
F. Sparsholt	Do.	129	516
*O. Goos	Do.	120	515
*Mrs. L. Andersen	Do.	135	509
*J. W. Newton	Do.	121	502
Jas. Hutton	Do.	103	497

EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE—*continued.*

Competitors.	Breed.	August.	Total.
	LIGHT BREEDS—*continued.*		
*J. M. Manson	White Leghorns	125	493
*J. W. Short	Do.	122	488
*R. C. J. Turner	Do.	128	485
*H. P. Clarke	Do.	134	482
*Bathurst Poultry Farm	Do.	120	472
*G. Williams	Do.	129	471
*Arch. Neil	Do.	122	459
G. Marks	Do.	106	459
G. W. Rogers	Do.	112	449
*C. A. Goos	Do.	124	444
*Mrs. R. E. Hodge	Do.	116	443
*A. C. G. Wenck	Do.	112	442
Jas. Harrington	Do.	102	436
*H. Fraser	Do.	117	431
W. A. and J. Pitkeathly	Do.	112	425
W. Becker	Do.	118	415
C. Quesnell	Do.	113	405
W. and G. W. Hindes	Brown Leghorns	113	400
Chapman and Hill	White Leghorns	105	393
Jas. Earl	Do.	101	392
*J. Purnell	Do.	126	389
*Mrs. E. White	Do.	105	375
E. Ainscough	Do.	113	371
Parisian Poultry Farm	Do.	112	353
*N. J. Nairn	Do.	119	348
	HEAVY BREEDS.		
*W. Becker	Chinese Langshans	138	592
*R. Burns	Black Orpingtons	152	581
*Jas. Ferguson	Chinese Langshans	144	555
*Jas. Potter	Black Orpingtons	140	553
*Jas Hutton	Do.	130	541
*Mrs. A. E. Gallagher	Do.	131	541
J. R. Douglas	Do.	129	528
*E. Walters	Do.	121	504
*Mrs. A. Kent	Do.	131	503
*E. F. Dennis	Do.	121	496
*H. M. Chaille	Do.	110	486
R. Conochie	Do.	117	484
*Parisian Poultry Yard	Do.	141	483
W. T. Solman	Do.	139	481
*T. Hindley	Do.	132	478
*R. Holmes	Do.	122	467
Beckley Poultry Farm	Do.	101	437
G. E. Rogers	Do.	121	427
*C. C. Dennis	Do.	128	423
*J. H. Jones	White Wyandottes	117	421
Rev. A. McAllister	Black Orpingtons	123	417
Jas. Ferguson	Plymouth Rocks	106	407
W. F. Ruhl	Black Orpingtons	124	401
H. B. Stephens	Do.	107	393
W. G. Badcock	Chinese Langshans	117	376
V. J. Rye	Black Orpingtons	110	355
F. J. Murphy	Do.	110	277
Jas. Ferguson	Rhode Island Reds	100	263
Mos. Stephens	Black Orpingtons	107	241
Totals		8,194	30,928

* Indicates that the pen is being single tested.

DETAILS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
C. H. Singer	94	135	104	89	98	111	631
W. and G. W. Hindes	90	109	93	86	114	115	607
N. A. Singer	90	107	112	107	95	94	605
S. L. Grenier	86	93	102	93	95	90	559
Ancona Club	87	92	113	80	88	98	558
Oakleigh Poultry Farm	105	98	86	86	98	80	553
Rockview Poultry Farm	95	102	91	89	71	75	523
Beckley Poultry Farm	93	77	68	91	96	97	522
O. Goos	77	92	94	82	80	90	515
Mrs. L. Andersen	63	93	98	98	78	79	509
J. W. Newton	90	89	80	61	86	96	502
J. M. Manson	82	74	100	98	77	62	493
J. W. Short	78	85	86	91	87	61	488
R. C. J. Turner	76	83	80	83	70	93	485
H. P. Clarke	93	54	91	74	88	82	482
Bathurst Poultry Farm	83	85	69	88	80	67	472
Geo. Williams	92	94	63	72	79	71	471
Arch Neil	68	72	58	90	97	74	459
C. A. Goos	75	93	66	77	63	70	444
Mrs. R. E. Hodge	66	75	65	87	80	70	443
A. C. G. Wenck	76	61	73	79	66	87	442
H. Fraser	79	61	66	68	77	80	431
J. Purnell	69	56	74	51	82	57	389
Mrs. E. White	54	60	79	69	59	54	375
N. J. Nairn	71	44	69	60	52	52	348
HEAVY BREEDS.							
W. Becker	103	110	105	95	96	83	592
R. Burns	106	77	92	87	136	83	581
Jas. Ferguson	99	105	85	88	92	86	555
Jas. Potter	75	104	91	89	83	111	553
Jas. Hutton	97	95	101	86	83	79	541
Mrs. A. E. Gallagher	87	97	89	91	87	90	541
E. Walters	104	106	75	75	70	74	504
Mrs. A. Kent	81	112	76	106	71	57	503
E. F. Dennis	99	85	76	78	83	75	496
H. M. Chaille	80	95	90	88	60	73	486
Parisian Poultry Farm	48	76	88	96	90	85	483
T. Hindley	83	93	91	92	59	60	478
R. Holmes	66	64	82	72	87	96	467
C. C. Dennis	71	81	46	76	73	76	423
J. H. Jones	71	74	79	72	45	80	421

P. M. PITT, Acting Principal.

THE ZILLMERE EGG-LAYING COMPETITION FOR AUGUST.

August was an important month in the National Utility Poultry Breeders' Association competition at Zillmere, as the final weighing of eggs was done during the first week. This year 109 out of 132 birds competing reached the 2-oz. standard, and the scores of those who failed to get the weight are indicated by the letter "u" placed in front of the figures.

Two thousand nine hundred and seventy-three eggs were laid during the month, an average of just over 22½ eggs per bird.

No. 63 had bowel trouble, otherwise there has been no sickness reported, nor has there been any cases of broodiness during the period.

EGG-LAYING COMPETITION—*continued.*

WHITE LEGHORNS.

Pen No.	Owner.	Weight of Egg. Oz.	Aug.	Total.	Pen No.	Owner.	Weight of Egg. Oz.	Aug.	Total.
62	Miss L. M. Dingle ...	1.91	28	u131	45	F. R. Koch	1.97	24	88
75	W. Shaffrey	1.28	25	u121	48	R. D. Chapman ...	2.14	21	87
14	Enroh Pens	1.96	26	u120	73	A. Hodge	2.14	24	87
8	Oakleigh P.F. ...	2.08	25	114	10	R. C. J. Turner ...	1.95	24	u86
15	W. J. Berry	1.92	22	u114	57	H. Fraser	2.01	21	86
65	Robert Duff	2.02	27	109	2	Carinya P.F. ...	2.12	24	85
72	W. H. Forsyth ...	1.93	25	109	53	H. Holmes	1.86	27	u84
50	J. Harrington ...	2.00	25	108	37	G. Williams	2.10	23	83
66	Robt. Duff	2.11	26	108	36	J. T. Webster ...	2.05	22	81
27	H. T. Britten ...	1.95	25	u107	74	A. Hodge	2.08	22	81
54	H. Holmes	1.91	29	u105	40	J. Earl	2.19	23	80
81	J. E. G. Purnell ...	2.04	24	105	11	A. Neil	2.12	22	79
64	S. Lloyd	1.98	23	104	12	A. Neil	1.84	22	u79
33	A. S. Walters ...	2.09	26	103	56	G. Baxter	2.28	20	79
61	Miss L. M. Dingle ...	2.04	22	103	78	W. Smith	2.18	23	78
13	Enroh Pens ...	2.11	23	102	77	W. Smith	2.34	20	76
16	W. J. Berry	1.89	23	u102	23	Parisian P.Y. ...	2.09	23	75
22	M. F. Newberry ...	2.11	24	102	34	A. S. Walters ...	1.94	25	u74
30	W. and G. W. Hindes	1.97	24	101	35	J. T. Webster ...	2.07	20	74
51	Kidd Bros.	2.30	25	101	25	E. Stephenson ...	1.93	21	u73
41	W. Wakefield ...	2.07	23	101	83	L. Andersen	2.11	23	73
18	A. W. Ward	2.03	22	100	63	S. Lloyd	1.91	8	u71
49	J. Harrington ...	2.31	22	99	44	Kelvin P.F.	2.07	22	69
76	W. Shaffrey	2.22	21	99	6	P. J. Fallon ...	1.97	22	67
4	T. H. Craig	2.13	25	98	17	A. W. Ward	2.01	22	67
7	Oakleigh P.F. ...	2.08	23	98	85	A. Cowley	2.19	18	64
28	H. T. Britten ...	2.03	23	98	21	M. F. Newberry ...	2.12	24	63
19	W. Witt	2.06	26	96	46	F. R. Koch	2.21	20	63
43	Kelvin P.F.	2.01	24	96	58	H. Fraser	1.87	27	u63
59	G. Scaletti	2.24	25	96	24	Parisian P.Y. ...	2.09	19	61
70	R. Shaw	2.10	25	96	32	H. Needs	2.25	21	61
20	W. Witt	2.12	25	95	5	P. J. Fallon	2.04	20	59
3	T. H. Craig	2.31	22	95	39	J. Earl	1.99	22	59
38	G. Williams	2.01	24	95	67	J. and G. Green ...	2.14	17	59
84	L. Andersen	2.22	24	94	47	R. D. Chapman ...	2.08	25	54
55	G. Baxter	2.04	22	93	52	Kidd Bros.	2.02	24	47
42	W. Wakefield ...	2.09	23	92	79	W. Bliss	2.19	22	40
69	R. Shaw	2.21	25	92	68	J. and G. Green ...	2.19	16	39
29	W. and G. W. Hindes	1.89	24	u90	82	J. E. G. Purnell ...	2.07	21	39
1	Carinya P.F. ...	2.23	24	89	60	G. Scaletti	2.17	12	31
26	E. Stephenson ...	2.31	21	89	9	R. C. J. Turner ...	1.85	17	u27
31	H. Needs	2.49	23	89	80	W. Bliss	2.03	10	26
71	W. H. Forsyth ...	2.14	23	89	86	A. Cowley	2.13	13	21

BLACK ORPINGTONS.

95	J. Potter	1.98	29	138	116	C. C. Dennis	2.32	27	89
92	J. Pryde	1.85	25	u125	105	W. Smith	2.00	22	88
112	H. M. Chaille ...	2.13	24	119	118	E. C. Raymond ...	2.22	23	84
115	C. C. Dennis	1.83	27	u118	87	Parisian P.Y. ...	2.29	26	84
109	T. Brotherton ...	1.98	30	115	88	Parisian P.Y. ...	2.37	28	82
113	E. Walters	1.97	26	112	93	H. B. Stephens ...	1.77	18	u82
120	J. Harrington ...	2.39	25	110	108	E. F. Dennis ...	2.12	21	79
89	K. Macfarlane ...	2.07	29	108	114	E. Walters	1.94	22	u78
96	J. Potter	2.01	27	107	106	W. Smith	2.04	21	77
119	J. Harrington ...	2.54	18	107	91	J. Pryde	1.90	23	u75
104	L. Pritchard	1.99	22	105	94	H. B. Stephens ...	2.40	23	70
102	Enroh Pens	2.14	18	102	90	K. Macfarlane ...	2.58	22	65
101	Enroh Pens	2.16	28	101	99	S. Donovan	2.18	19	65
110	T. H. Brotherton ...	2.19	28	98	103	L. Pritchard	2.00	22	61
117	E. C. Raymond ...	2.09	27	95	98	W. Shaffrey	2.15	27	56
107	E. F. Dennis ...	2.10	18	94	100	S. Donovan	1.99	21	49
111	H. M. Chaille ...	2.23	24	93	97	W. Shaffrey	2.13	22	38

OTHER BREEDS.

131	W. H. Forsyth (S.W.)	2.12	24	118	127	A. S. Walters (B.R.)	2.05	14	51
128	A. S. Walters (B.R.)	2.00	25	108	124	J. Ferguson (Anc.) ...	2.09	23	47
126	J. Ferguson (Lang.)	2.18	21	101	121	Parisian P.Y. (B.L.)	1.87	19	u43
125	J. Ferguson (Lang.)	2.05	26	94	130	R. A. Girling (Min.)	2.21	12	34
122	Parisian P.Y. (B.L.)	2.05	19	70	129	R. A. Girling (Min.)	—	9	22
123	J. Ferguson (Anc.) ...	2.09	19	59	132	W. H. Forsyth (S.W.)	1.66	19	u19

General Notes.

Regulations, Diseases in Poultry Act.

Regulations have been issued under the recently enacted Diseases in Poultry Act. These Regulations are on the same lines as the Regulations under the Diseases in Stock Act.

State Wheat Board Election.

A Regulation has been issued under the Wheat Pool Act the effect of which is that the electors for the forthcoming election for members of the State Wheat Board, for the season 1923-24, shall be those growers of wheat who have delivered to the Board wheat harvested during the season 1921-22 or 1922-23.

Appointments.

Harold Henry Collins has been appointed Chairman of the Atherton Maize Pool Board.

R. R. Anson has been appointed Assistant Instructor in the Cotton Section of the Department of Agriculture and Stock.

B. R. Riley has been appointed Millowners' Representative on the Central Sugar Cane Prices Board, in the room of P. M. H. Goldfinch, resigned.

Milk Pool Nominations.

The following nominations have been received by the Department of Agriculture and Stock for positions on the Board to administer the proposed Milk Pool:—

William Johnston, Strathpine.
R. J. Morgan, senr., Strathpine.
A. W. Johnston, Thagoona.
John Coch, Kircheim.
W. J. Hawkins, Bald Hills.
Francis Fredericks, Bald Hills.
W. R. Moon, Brookstead.
A. B. McDonald, Rocklea.
W. C. Reading, Dakabin.
J. P. Walsh, Rosewood.
F. A. Tullock, Veresdale.
R. E. Clay, Samson Vale.

More than the requisite number of dairymen, as provided for in the Act, have asked for a referendum on the question as to whether the pool shall be constituted, and accordingly a vote will shortly be taken to decide whether the pool shall be established or not.

Dingo and Marsupial Destruction.

The Regulations have been issued under "*The Dingo and Marsupial Destruction Acts*, 1918-1923," the effects of which are as follows:—

No person shall keep in his possession in or upon any premises any live dingo or fox unless he has previously obtained the permission of the Minister to keep such animal for zoological purposes.

The bonus payable in respect to scalps under the Act shall be 15s. for the scalp of a dingo, 5s. for the scalp of a fox, 3d. for the scalp of a wallaby, 2d. for the scalp of a kangaroo rat, paddymelon, or bandicoot.

By the amending Act recently passed the payment of the bonus for dingoes and foxes is now compulsory by all Boards, but whether they pay the bonus for the other animals mentioned will be optional with each of them.

Provision is now made that a clerk or receiver shall permit the whole of the skins to be produced in lieu of the scalp for the purpose of securing a payment certificate, and shall by means of approved pliers so mark the skin that it cannot be presented again for payment. The primary object of this is to prevent the destruction of fox skins, which have a distinct marketable value.

Under the Regulation they can now be marked, secure a bonus certificate, and be returned to the trapper.

Progressive Gympie.

The annual return of the output of primary products in the Gympie district, as compiled by the Gympie and District Progress Association, will serve to show what a productive district Gympie is. This district offers every opportunity to the willing and energetic settler to acquire lands suitable for almost every primary product. For dairying, fruit, cotton, canegrowing, agriculture, poultry-farming, pig-raising, and bee-keeping it is especially adaptable. The annual rainfall is about 60 in. per annum; the numerous creeks and the tortuous Mary River assure a permanent water supply. Markets are easily accessible, and a special train leaves weekly with fruit and produce for the Sydney, Melbourne, and Adelaide markets, whilst the local demand is fast increasing. The total output of primary products from 1st January to 31st December, 1922, as compiled by the association, is set down under their several headings. The output of honey amounts to several hundred tons.

	£
Butter, 5,493,650 lb., for which suppliers were paid	343,178
Timber	317,586
Fruit (bananas, pineapples, &c.)	195,021
Agricultural produce	112,718
Gold, 18,497 oz., valued at	64,034
Pigs, 12,556, realised	27,960
Minerals (manganese ore, lime, &c.)	2,551
Total value	£1,063,048

Staff Changes and Appointments.

Mr. J. S. Penrose, B.V.Sc., M.R.C.V.S., and Mr. M. J. Reidy, M.R.C.V.S., the recently appointed part-time Veterinary Officers for the Northern and Central Districts respectively, have been appointed Inspectors under the Diseases in Stock Act.

Mr. Maurice Wall has been appointed Assistant Cane Tester at Bingera Sugar Mill at Bundaberg, as from the 22nd August, until the cessation of crushing operations at that mill.

Police Constable H. H. Taylor has been appointed an Inspector of Slaughter-houses.

The constitution and rules of the Central Queensland Native Birds' Protection Association have been approved under "*The Animals and Birds Act of* 1921," and Messrs. L. T. Jones, H. W. Walker, John F. C. Richter, C. W. Wright, L. F. Landsberg, A. Alden, C. A. Moloney, A. V. Lucas, A. C. Boldeman, and P. V. Moloney of that Association have been appointed Officers under and for the purposes of the abovementioned Act.

Mr. W. H. J. Parker has been appointed an Honorary Inspector under the Diseases in Plants Act.

Mr. J. K. Murray, science master and lecturer in bacteriology at the Hawkesbury Agricultural College, New South Wales, has been appointed Principal of the Queensland Agricultural High School and College, at Gatton. Mr. Murray holds the degrees of B.A. and B.Sc.Agr. of the University of Sydney, and he also holds the National Diploma in Dairying (N.D.D.) of the Dairy School for Scotland. His work at the Hawkesbury College comprised lecturing upon agricultural and dairy bacteriology, dairy technology, and the feeding of farm animals. During the war he served with the Australian Imperial Forces, and subsequently he attended a school of instruction at Kilmarnock, Scotland, at which he gained the National Diploma in Dairying. He was one of that able company of Australian agriculturists who staffed the agricultural farm at Sutton Veny, on Salisbury Plain, which was established by the A.I.F. Education Service after the Armistice, with the object of fitting Diggers for rural life after their discharge from the Army. Like many more far-sighted and energetic Australians who proved themselves in agricultural schools in Scotland and other parts of the United Kingdom, he took full advantage of the opportunities offered under the non-military employment section of the A.I.F. Education Service while awaiting repatriation. The remarkably fine work of the A.I.F. Education Service, particularly for agricultural and stock students, has never been properly recognised in Australia. Under that scheme Diggers were enabled to obtain the best of practical tuition from the leading agriculturists and stockbreeders in Great Britain. Agricultural and stock tours of selected students through all the agricultural counties of the United Kingdom, to the Channel Islands, Denmark, and America were arranged. In addition short intensive courses on agricultural and stock subjects were provided in the Colleges and Universities. Mr. Murray was one of those who seized and made the best of the unique and extraordinarily good opportunities offered to A.I.F. men. Before returning to Australia Mr. Murray visited the United States and Canada, and made exhaustive

inquiry respecting agricultural education in many of the colleges and schools there. He was strongly recommended for the position to which he has been appointed by Professor R. D. Watt, Dean of the Faculty of Agriculture, University of Sydney, and by H. M. Potts, F.C.S., late Principal of the Hawkesbury Agricultural College. The Government has requested him to enter upon his duties at as early a date as possible.

Mr. L. L. Gudge, the cotton-grader appointed by the Government, has arrived in Brisbane from Great Britain. He was selected through the Agent-General (Hon. J. A. Fihelly) on the recommendation of leading cotton authorities of Great Britain.

Codlin Moth Control.

Now that the season for spraying for the control of codlin moth is advancing, the Chief Instructor in Fruit Culture (Mr. J. M. Ward) calls the attention of growers of apples and pears to the following Regulations under "*The Diseases in Plants Act of* 1916":—

> "No occupier or owner or his agent of an orchard shall permit any fruit, whether diseased or not, to lie on the ground, and shall forthwith gather all fruit lying on the ground and destroy all that are diseased by submitting them to the process of boiling, or as otherwise instructed by an inspector.
>
> "The occupier or owner or his agent of any orchard in which codlin moth of pip fruit is present shall cause all bearing apple, pear, and quince trees to be sprayed with an approved brand of arsenate of lead, to the satisfaction of an inspector. The first spraying shall be given when the petals are falling from the flowers, and two or more subsequent sprayings, as may be deemed necessary by an inspector, shall be given at intervals not exceeding twenty-one days from the time of the first application.
>
> "The occupier or owner or his agent of any orchard in which codlin moth of pip fruit is present shall cause all apple, pear, and quince trees to be kept clear of dead bark and broken limbs. Any stakes, props, or other material likely, in the opinion of an inspector, to harbour the larvæ or pupæ of the codlin moth of pip fruit shall be removed, and, if found to be infested, destroyed by the said owner or occupier."

It will be seen by the foregoing Regulations that, among other things, it is compulsory to spray for the purpose of keeping under control that troublesome pest, the codlin moth.

Providing growers will carry out thorough spraying with arsenate of lead at the correct periods, codlin moth can practically be eliminated from an orchard.

During the first application of the spray material it is wise to fill the calyx of each fruit with a small quantity of the poison before the closing of the calyx. This acts as a protection for the fruit against the insect for a considerable period.

The closing of the calyx of the apple takes place before that of the pear.

During the second application—when the fruit is about the size of a pigeon's egg or thereabouts—care should be taken to see that the upper portion of the foliage is well covered with the spray. In many instances the moth lays its eggs upon the foliage, and when the caterpillar hatches out it may consume portion of the leaf before it reaches the fruit, therefore by having the foliage well covered with the arsenate of lead, the young caterpillar becomes poisoned when having its first meal and before any damage to the fruit is done.

The third spraying should be chiefly confined to thoroughly covering the fruit, so that upon the insect attacking the fruit it first has to eat through a poisonous covering and is therefore killed.

It may be to the growers' interest to apply a fourth spray; in this respect one will have to be guided by circumstances. If the season is a dry one it will be found that it pays to apply a fourth application. Thoroughness of application is absolutely essential if good results are to be obtained.

The writer has proved over and over again that an orchard can be kept comparatively free of codlin moth if spraying with arsenate of lead is properly carried out.

During the 1921-1922 fruit season the writer had a number of demonstration plots in Tasmania, where special attention was directed towards spraying for the pest in question.

In the orchard of Mr. C. S. Marsh, of Huonville, only one spraying had been carried out the previous year, when the amount of infected fruit was 60 per cent.

During the 1921-22 season the trees were sprayed three times with Jacques' "Elephant" brand arsenate of lead (paste) as follows:—

First spraying, 5th November: 2 lb. arsenate of lead to 40 gallons water.

Second spraying, 26th November: 2 lb. arsenate of lead to 40 gallons water.

Third spraying, 24th December: 2 lb. of arsenate of lead to 40 gallons water.

The first application was made whilst the calyx was open on the Scarlet Nonpariels, but was rather late with the Ribston Pippins, as fully 50 per cent. of them were beyond the calyx stage. Notwithstanding this, the loss of fruit owing to being affected with codlin moth during the season already mentioned amounted to only 4 per cent., which, compared with a 60 per cent. loss the previous year, was highly satisfactory.

During the same season, another demonstration plot was obtained at the orchard of Mr. H. Cuthbert, of Franklin. The varieties sprayed being Ribstons, Scarlet Norpariel, Sturmers, King of Pippins, and French Crabs, also a few pear trees; all of these were badly infested with codlin moth the previous year. The plot was divided into four sections each of two rows, and a different brand of arsenate of lead used on each section. Following are the formulæ and dates of application:—

First spraying: 28th October, 1921.

Second spraying: 18th November, 1921.

Third spraying: 3rd December, 1921.

Two rows sprayed with Swifts (paste form) of arsenate of lead, 2 lb. to 40 gallons water.

Two rows "Vallo" arsenate of lead, 2 lb. to 40 gallons water.

Two rows "Blue Bell" arsenate of lead, 2 lb. to 40 gallons water.

Two rows Sherwin-Williams (powder), 1 lb. to 40 gallons water.

From the first picking of the fruit a careful record of infested fruit was kept, and the loss of fruit from codlin moth amounted to only 3 per cent. As far as could be seen there was no difference in the various brands of arsenate of lead used; all gave equally good results.

The owners of the orchard sprayed a portion of the remaining part of the orchard twice only, and from this section the loss was 7 per cent.

By the above experiments it can be seen that in practice the numbers and thoroughness of application governs, to a very great extent, the control of this pest.

It may be well to mention that the trees in question were from thirty to forty years old and fairly large.

When using the paste form of the lead, use 5 to 6 lb. per 100 gallons of water, and the powder from 2 to 3 lb. per 100 gallons. The fruit inspectors in the Stanthorpe district have been instructed to be strict in enforcing the Regulations in respect to codlin moth. By doing this it will be for the ultimate good of individual growers and the district as a whole.

Citrus Bug Control.

The efficacy or otherwise of various applications against the Bronze Orange Bug of citrus trees has recently been tested by members of the staff of the Fruit Branch, Department of Agriculture, in infested orchards at Montville. Cyanide gas was first given attention, varying strengths being applied—from what is set down as a normal dose to increased dosages up to 75 per cent. From results, it was deduced that a 50 per cent. increase and twenty-minutes application was sufficient to cause the bug to fall to the ground, where a percentage recovered from the effects of the gas, 63 to 93 per cent. being destroyed. From this it was evident that cyaniding alone would not be taken as totally efficient. Numerous spraying formulas were applied, but the results were less encouraging. Practically all of standard sprays usually applied against scale insects had been extensively tried by various growers, consequently miscible oils, kerosene emulsion, and lime-sulphur solution were omitted. Resin wash (reduced to 1 lb. of resin in 3 gallons of water) gave poor results. Pyrethrum solution, Katakilla, Blackleaf 40, Salomia and Derrisene, at increased strengths were equally unsatisfactory, and the addition of resin as a sticker did not materially add to their values. "Boüilli Labordi," a previously untried application, the formula being received from the Agricultural Chemist, gave the best results.

From these experiences, it is deduced that a dual application is necessary to encompass the complete destruction of the pest—cyaniding to cause its fall to the ground, where its accessibility admits of its being conveniently dealt with either by spraying with concentrated kerosene emulsion or caustic-soda-arsenic solution.

The following spray formulæ were liberally applied to the trees and foliage:—

Pyrethrum, 1 oz. in 2 gallons of water.

Katakilla, 4 oz. in 2 gallons of water.

Salomia, 10 oz., Derrisene 1 oz., in 2 gallons water.

Resin, 1 lb., soda ½ lb., in 3 gallons water.

Blackleaf 40, 1 oz., resin 1½ lb., soda ¾ lb., in 6 gallons of water.

"Bouilli Labordi," 8 oz. resin, 3 oz. caustic soda, 6 oz. methylated spirits, 5 oz. strong liquid ammonia, 1 quart water. Heat if necessary to dissolve resin and dilute 1 in 15.

Answers to Correspondents.

Home-grown Cabbage Seed.

"AMBITIOUS" (Wynnum)—

There is no reason why cabbage and cauliflower seed grown in the Brisbane district should not prove fertile. In order, however, to prevent cross-fertilisation it will be necessary to cover the heads of the plants, prior to the flower opening, with fine mosquito netting. If this is done the seed should come true to type.

Whether the seed will have the same vitality as that grown in a colder district it is not certain. There is some uncertainty as to whether the plants grown from the seed here will possess the same stamina as those grown from seed matured in a colder climate.

Grasses and Fodder Crops.

"BREEDER" (Warra)—Mr. A. E. Gibson, Instructor in Agriculture, advises:—

(1) Prairie Grass (*Bromus unioloides*) would, it is thought, give you more permanent results than *Phalaris bulbosa*, apart from which the seed of the former is more readily procurable in this State. It is doubtful whether you will be able to obtain seed of *Phalaris bulbosa* in this State, although it may probably be obtained from seedsmen in Sydney or Melbourne.

(2) Of the three mentioned—*i.e.*, Perennial Rye Grass, Cocksfoot, and Rhodes Grass—the lastmentioned is the only one which will stand the climatic conditions usually experienced in your district.

(3) Practically speaking, there is little to choose between any of the members of the saccharine sorghums for ensilage purposes, but perhaps for general utility purposes Soudan Grass is to be preferred, with Nuphee Sorghum Saccharatum, Saccaline, and Early Amber Cane next in order of succession.

(4) Soudan Grass conserved in the form of hay, for which purpose it is applicable by reason of its slender stalk, would be found perhaps the most useful.

(5) In this instance you probably refer to cereals and would therefore mention barley (feed), peas, and wheat for winter, and maize and grain sorghums for summer sowings. Artichokes (Jerusalem) and sugar-beet are useful forms of root crops for summer and winter sowing respectively.

(6) Pigs thrive on lucerne; but for fattening purposes some form of concentrate should be given in addition.

(7) The sowing of crops for grazing-off purposes, excepting that of grass, is not recommended, it being considered that the practice of feeding-off is wasteful. Fodder crops of the following varieties should be cut and fed to stock, and will be found beneficial for milk-production purposes:—Lucerne, millets, panicums, sorghums, and suchlike summer-growing crops, whilst a mixture of peas or vetches with either rye, barley, oats, or wheat forms a useful fodder for winter growing.

(8) It is quite possible during seasons of normal moisture to produce linseed (flaxseed) as a winter-growing crop in your district, providing, of course, that careful attention has been given to the initial preparation of the soil. Millet is a summer-growing crop and is quite separate and distinct from linseed.

Soudan Grass.

"A.H." (Wondai)—

All of the Sorghum family are dangerous to stock prior to flowering. Soudan grass (a member of the Sorghum family) should not be grazed off at any time; that method is too wasteful. Cut for hay or conserved as ensilage it is amongst the best of the family. Prussic acid is present in greater or lesser quantities during the immature stages of all Sorghum growths.

To Scour and Tan Sheepskins.

R.S. (Beechmont)—Mr. W. G. Brown, Sheep and Wool Expert, advises:—

For preference the skin should be in what is called the "green" stage—*i.e.*, it must never have been dried after removal from the animal. The skin should be scraped and all fatty particles removed. Then soak it in a strong soapy solution, using a fair-sized tub. The skin and wool is thus easily washed snow white. Be sure to wash in clean cold water after removing from the soapy water. Then take a clean bag, or square of calico, and lay the skin upon it, woolly side down, and apply a solution of salt and alum. Proportions are one part alum to two of salt. This should be applied over the whole of the pelt with a swab, and at a temperature of about 100 degrees Fahr. The number of applications vary as the thickness of the pelt. Lambskins, for instance, require about three applications; mature sheepskins require four or five applications. Cover the pelt between the operations. The skin is then allowed to dry in the shade, and then a flat piece of sandstone can be used to soften the skin. It will be a pure white colour. The final touch should be given with pumice stone, which gives a smooth finish. In the case of dry skins, they must be soaked in soft water for about three days. The procedure described may then be adopted.

Curriers and tanners use knives made especially for the work.

After the skins are dealt with as described they should be placed pelt side down on a table and a flexible cane or smooth stick applied across the end hanging over the edge, and thoroughly beaten from the butt to the tip of the staple. This opens out the wool and removes sticks and light seeds and other foreign substances.

A COLLEGE ON WHEELS.

The travelling domestic science car just built at the Ipswich railway workshops is, as far as the knowledge of education officials goes, the first of its kind in the world. Certainly it is the first in Australia. The car has set out on its educational mission along the Western line. Two members of the staff will give demonstrations at Charleville, and then the car will proceed to Cunnamulla, where a course of some seven weeks, extending to the Christmas vacation, will be given to the girls of this outback district. The second car, which is also being built at the Ipswich works, will be ready in about five weeks' time. The real object of these travelling cars is to impart a knowledge of domestic science to girls in centres where the population is not large enough to warrant the establishment of permanent classes.

Farm and Garden Notes for November.

Field.—The recent unfavourable weather experienced throughout the wheat areas must naturally affect the ultimate yields. Many wheat areas are already beyond rain redemption. Harvesting on the Downs may be expected to commence in the latter part of October; but, unfortunately, it is not likely to extend over any lengthy period. Growers who have suffered a seasonal setback would be well advised to push on with recultivation for the purpose of making a saver out of cotton. Now is the cotton planting season, and delay in districts usually subject to early frosts means a risk of failure to secure a cotton rake-off.

Farmers are commencing to realise that quick-maturing wheats which possess a degree of rust resistance are more dependable than the slow-growing and often rust-susceptible kinds, which are gradually giving place to these and mid-season varieties.

Growers are advised to make every preparation to work up the surface of the ground immediately after the removal of their crops, so that the soil may be put into good condition to receive any rain which falls, the conservation of which is the best guarantee for the success of the next succeeding crop. Such initial preparation also encourages the early growth of all foreign and weed seeds, and permits of their eradication by the implements used to produce the desired soil mulch. In such manner paddocks are kept clean and the purity of crops is maintained. The careful preparation of areas intended for maize-planting cannot be too strongly impressed upon growers. Deep and thorough ploughing, followed by cross-ploughing and subsequent cultivation of the soil, must precede sowing if success would be attained; and all efforts must be concentrated to obtain a good surface mulch. Failure to follow up the subsequent sowings by harrowing prior to the appearance of the young plant conduces to weed growths and very often entails, by neglect of this operation, subsequent hand-hoeing between the plants in the drills. Harrowing should be discontinued before the plant breaks through the surface, otherwise damage will accrue to the tender shoots of the young plants. When the young maize plant has hardened up it may, with advantage, be lightly harrowed in the direction of the drills, but such practice must discontinue once the plant has attained a height of 6 inches. Close cultivation by inter-row cultivation implements is necessary after every shower to conserve moisture and to prevent weed growth, care being taken to ensure each cultivation being shallower than the preceding one, and so prevent damage to the root system of the plant, which is extensive. Inter-row cultivation should cease with the advent of the cob on the plant; and, if proper attention has been given to the crop, it should, at this period, be unnecessary. Where crops are planted on the check-row principle, inter-row cultivation is facilitated, and more even crops result.

The French millets (red and white), owing to their rapid maturing qualities, form excellent intermediate or supplementary crops, and are suitable for present sowing. Their value for fodder and seed purposes is worthy of more general recognition at the hands of the average farmer.

Past dry periods have impressed upon us the necessity of providing during good seasons against the return of less favourable ones, and in this connection the cultivation of quick-growth fodder plants appeals to us. Many varieties of useful classes of fodder can be cultivated over a large portion of this State; chief of which, perhaps, are the sorghum family for grain and fodder purposes. Of the latter, Sudan grass has much to commend it, and is fast becoming one of the most favoured by stockowners. Grain sorghums, of which Feterita, Red Kafir, and the various Milos are examples, should occupy a more prominent position for purposes of horse and pig feeding, and are particularly suited to those localities which are unsuitable for maize production. Some varieties of sorghum have strong frost-resisting qualities, and lend themselves to those localities where provision for some form of succulent fodder is necessary during the winter months.

Orchard Notes for November.

THE COAST DISTRICTS.

November is somewhat of a slack month for fruit in the coastal districts, as the citrus crop, exeecpting a few Valencia Late oranges, off-season lemons, and a few limes, is over. Pineapples are also scarce, as the late spring crop is finished, and there are only comparatively few off-season fruits ripening. The main summer crop of fruit in the principal producing districts is only in the flowering stage, though that in the more tropical parts is ready for marketing. It is also a slack month for bananas, as the summer fruit is not yet fully developed, and the bunches that make their appearance are usually poor. They have been slow in developing on account of the comparatively cool weather of winter and early spring, when the suckers were more or less at a standstill. Young suckers should, however, be making vigorous growth now, and the plantation will require constant attention to prevent the stools being overcrowded with too many suckers. Keep the land well worked and free from weeds of all kinds, as good growth now means good bunches in the autumn and early winter. Where there is a danger of the soil washing badly with heavy rain, rows of Mauritius, velvet, or other suitable beans should be planted at right angles to the fall of the land, as the growth they make will tend to hold the soil and thus save any from being washed away. When planting beans of any kind, either to prevent washing or for green manuring, don't forget to manure them, as thereby you will get a much greater yield, and as none of the manure is removed from the soil, as the crop is allowed to lie and rot on the ground, it is all made use of eventually by the permanent crop.

A good all-round manure for a bean crop is a mixture of 1 cwt. of sulphate of potash and 4 cwt. of basic superphosphate or finely-ground phosphatic rock to the acre, and, if the soil is deficient in lime, a dressing of not less than half a ton to the acre will be found very beneficial, as all leguminous plants require lime to yield their maximum return both of haulm and pulse. The pineapple plantations require to be kept in a state of thorough tilth, and no weeds must on any account be allowed to grow. If blady grass makes its appearance it must be stamped out, as once it gets established in the rows it is only a short time before it takes control, and the plantation is ruined, so that it can only be brought back into profit by taking out the pines, killing the blady grass, and, after thoroughly and deeply working the land, manuring it and replanting.

The planting of pineapples and bananas can be continued throughout the month, taking care to see that the land is properly prepared and that the advice given in previous monthly notes is followed. Young pawpaw plants that have been raised in the seed bed can be set out now, as also can young passion fruit. Citrus orchards require to be well looked after; the ground must be kept in a state of thorough tilth, and if the trees show the slightest sign of distress, owing to lack of moisture in the soil, they must be given a thorough irrigation if water is available for this purpose. The trees should be carefully examined from time to time so as to note when young scale insects of any kind are hatching out, and when this is noted they should be sprayed with a weak emulsion of a miscible oil consisting of one part of oil in forty parts of emulsion, as this is quite strong enough to kill any young scales before they develop their protective covering. As stated in these notes previously, no oil sprays should be used when the trees are suffering from lack of moisture, as they are then likely to do more damage than good to citrus trees. If scale insects are very bad, and it is important that the trees are sprayed, a weak lime-sulphur

spray, or even a soap and tobacco or weak resin wash, will kill the young scales as they hatch out. In the earlier districts a keen lookout must be kept for the first appearance of the mites, which are the direct cause of the darkening of the skin of the fruit known as "Maori." The first indication of the trouble is that when the sun is shining on the young fruit, it appears to be covered with a grey dust, and if the fruit is examined with a good lens it will be seen to be covered with large numbers of small yellowish slug-like insects which are living on the skin. Spraying with sodium or potassium sulphide washes, as recommended by the Department, or with a weak solution of lime sulphur, will destroy these insects and prevent the fruit from turning black. Borers of all kinds should be looked for and destroyed wherever found. Water sprouts, if not already removed, should be cut away. Vines will require careful attention, and the vineyard should be kept in a state of thorough cultivation. Spraying for Downy mildew and black spot should be continued, if necessary, as well as sulphuring to prevent oidium.

Fruit fly must be systematically fought whenever seen, and special care must be taken to gather and destroy any early ripening peaches or other fruits that may be infested. If this is done systematically by all growers, as provided by the Diseases in Plants Act, there will be many less flies to attack the later crops of mangoes and other fruits.

Leaf-eating insects of all kinds should be systematically fought wherever seen, by spraying with arsenate of lead, and potatoes and tomatoes should be sprayed with a combined spray consisting of Bordeaux or Burgundy mixture and arsenate of lead, so that diseases such as early blight and Irish blight may be prevented and leaf-eating insects, which frequently cause very heavy losses to these crops, be destroyed.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Keep the orchards and vineyards in a thorough state of cultivation, so as to keep down all weed growth and conserve moisture in the soil. This is important, as, if a long spell of dry weather sets in, the crop of summer fruit will suffer severely from the lack of moisture. Citrus trees should be irrigated where necessary, and the land kept in a state of perfect tilth. Spraying for codlin moth should be continued, and all pip fruit trees must be bandaged the beginning of the month; further, the bandages must be examined at frequent intervals and all larvæ contained in them destroyed. The neglect to spray thoroughly and to attend to the bandages properly is responsible for the increase in this serious pest in the Granite Belt, and growers are warned that they must pay more attention to the destruction of this pest if they wish to grow pip fruits profitably. Fruit fly may make its appearance in the cherry crop; if so, every effort should be made to stamp out the infestation at once, as, unless this is done, and if the fly is allowed to breed unchecked, the later ripening crops of plums, peaches, apples, pears, apricots, and Japanese plums are bound to become more or less badly infested. Combined action must be taken to combat this, the most serious pest of the Granite Belt, and growers must realise that, unless they take this action and see that careless growers do not breed the fly wholesale, they will never keep it in check, and it will always be a very heavy tax on their industry. Rutherglen bug is another serious pest in this district, and is propagated by the million by careless orchardists. The best remedy for this pest is to keep the orchard clean and free from weeds. Brown rot in fruit should be watched for carefully and, on its first appearance in a district, all ripening fruits should be sprayed with the sodium sulphide wash.

All kinds of leaf-eating insects should be kept in check by spraying with arsenate of lead, and all grape vines, potatoes, and tomatoes should be kept sprayed with Bordeaux or Burgundy mixture, the former for black spot and downy mildew, and the latter for early and late (Irish) blight.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1923.	OCTOBER.		NOVEMBER.		DECEMBER.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	5·34	5·50	5·4	6·8	4·51	6·31
2	5·33	5·50	5·3	6·9	4·51	6·32
3	5·32	5·51	5·2	6·10	4·51	6·33
4	5·31	5·51	5·1	6·11	4·50	6 34
5	5·30	5·52	5·0	6·12	4·50	6·35
6	5·29	5 52	5·0	6·13	4·50	6·36
7	5·28	5·53	4·59	6·13	4·50	6·36
8	5·27	5·53	4·59	6·14	4·50	6·37
9	5·25	5·54	4·58	6·14	4·51	6·37
10	5·24	5·54	4·57	6·15	4·51	6·38
11	5·23	5·55	4·57	6·16	4·51	6·39
12	5·22	5·55	4·56	6·17	4·52	6·39
13	5·21	5·56	4·56	6·18	4·52	6·40
14	5·20	5·56	4·55	6·18	4·52	6·40
15	5·19	5·57	4·55	6·19	4·53	6·41
16	5·17	5·58	4·54	6·20	4·53	6·41
17	5·16	5·58	4·54	6·20	4·53	6·42
18	5·15	5·59	4·53	6·21	4·54	6·42
19	5·14	6·0	4·53	6·22	4·54	6·43
20	5·13	6·1	4·52	6·23	4·55	6·43
21	5·12	6·1	4·52	6·24	4·55	6·44
22	5·11	6·2	4·52	6·25	4·56	6·45
23	5·10	6·3	4·52	6·25	4·56	6·45
24	5·9	6·3	4·52	6·26	4·57	6·46
25	5·9	6·4	4·51	6·27	4·57	6·46
26	5·8	6·4	4·51	6·28	4·58	6·47
27	5·7	6·5	4·51	6·28	4·58	6·47
28	5·7	6·5	4·51	6 29	4·59	6·48
29	5·6	6·6	4·51	6·30	5·0	6·48
30	5·6	6 7	4·51	6·31	5·0	6·49
31	5·5	6·7	...	...	5·1	6·49

PHASES OF THE MOON, OCCULTATIONS, &c.

3	Oct.	☽	Last Quarter	3 29 p.m.
10	,,	●	New Moon	4 5 p.m.
17	,,	☾	First Quarter	6 54 a.m.
25	,,	○	Full Moon	4 26 a.m.

Perigee Oct. 11th at 1·42 p.m.
Apogee Oct. 26th at 12·36 p.m.

The moon will be apparently very close to the planet Mars on the 9th at 4·49 a.m., just before sunrise. About seven hours later the moon will be in conjunction with the planet Mercury. Shortly afterwards Venus and Saturn will be in conjunction at 3·47 p.m. On the 17th at 9 p.m. Saturn will be in conjunction with the sun.

2	Nov.	☽	Last Quarter	6 49 a.m.
9	,,	●	New Moon	1 27 a.m.
15	,,	☾	First Quarter	7 41 p.m.
23	,,	○	Full Moon	10 58 p.m.

Perigee 9th Nov. at 1 a.m.
Apogee 22nd Nov. at 12·54 p.m.

Neptune will be in conjunction with the moon on the 3rd at 5·47 a.m. Venus and Jupiter will be in conjunction on the 5th at 6·11 a.m about 15 degrees east of the sun and setting about an hour later than it. Mercury will be in superior conjunction with the sun on the 16th at 10 a.m., passing it on the far side from west to east. It will be in conjunction with Jupiter on the 20th at 3·53 p.m.

8	Dec.	●	New Moon	11 30 a.m.
15	,,	☾	First Quarter	12 38 p.m.
23	,,	○	Full Moon	5 33 p.m.
31	,,	☽	Last Quarter	7 7 a.m.

Perigee 7th Dec. at 1 p.m.
Apogee 19th Dec. at 9·12 p.m.

The planets Mars and Saturn will be in conjunction but apparently separated by three diameters of the moon on the 2nd at 5·42 p.m. Saturn will be in conjunction with the moon but more than three diameters above it at 9 a.m. on the 5th. About two and a-half hours later Mars will be in conjunction with the moon but a good deal further above it. Mercury will be at its farthest distance east of the sun on the 28th at 2 a.m., setting about an hour and a-half after it.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 48 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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QUEENSLAND AGRICULTURAL JOURNAL

Vol. XX. NOVEMBER, 1923. Part 5.

Event and Comment.

The Current Issue.

The rapidly growing importance of the Queensland pig-raising industry is well recognised by the Government, and in order to give it a greater impetus the Department of Agriculture and Stock, through the Minister (Hon. W. N. Gillies), has secured the services of Mr. E. J. Shelton, an old Hawkesbury student and lecturer, whose work as a practical pig expert is already widely known in this State, as a travelling instructor. Under the caption "Classification in Pigs," Mr. Shelton contributes to this issue the first of a series of valuable articles on pigs and pig-raising. Mr. Eklund's interesting notes on "Irrigation in Queensland" are continued; they are attracting much attention from those concerned in our water problems. In observations on climatic cycles, Dr. Jensen discusses interestingly his theory of sunspot minima and their relation to drought and flood. Increasing interest in Red Polls has suggested some notes on the breed which will be useful to cattlemen. Entomological notes and other regular features cover a wide range of interest to readers, and as usual the Journal is well illustrated.

An Agricultural Session.

The parliamentary term just closed may well be described as an agricultural session. Not less than twelve measures, all relating to rural needs and problems, were initiated and piloted through Parliament by the Minister for Agriculture and Stock (Hon. W. N. Gillies). Some of the bills were of first importance to the industry, notably the Co-operative Associations Bill, Agricultural Bank Bill, Fruit Marketing Bill, and Cotton Industries Bill. The Minister for Lands (Hon. W. McCormack) also placed among the Queensland Statutes several important measures bearing on practical schemes of land settlement.

Co-operation at Work.

A comparatively little known 100 per cent. co-operative undertaking, instituted by the Queensland Department of Agriculture and Stock for the disposal of farmers' wool from small flocks, provides an excellent illustration of co-operation at work. The scheme enables the small sheep farmer to sell his wool without the intervention of any intermediary. The only charges are 10s. per bale for classing, freight, dumping, retailing, and any other out-of-pocket expenses. The numerical flock limit of farmers availing themselves of the marketing facilities under the scheme is 1,500 sheep. Sixty per cent. of the estimated value of the clip is payable to the farmer immediately on receipt of his consignment in the departmental woolroom. Each bale is classed and marketed so that it may not be offered under the "star lot" conditions usually applied to small consignments. The scheme has been in operation for several

years, and has proved an unqualified success, and therefore satisfactory to all concerned. With the farmers whom it was designed to benefit it is very popular. It is simply a plan by which the farmer sells his wool through the Department, obtains the highest possible price, and avoids the customary brokerage charges. The way it works is this: The wool on receipt is classed by departmental experts. It is then listed for sale as soon as possible, and returns, less the small handling charges mentioned, are paid promptly. The Department makes neither profit nor loss on the transaction. Costs are closely watched, and since 1916, the year of its inception, income and expenditure have balanced. Last year £13,000 worth of wool was sold. This was the produce of about 250 small flocks in many parts of the State, including the Gulf country. The scheme is truly co-operative, and only two consignors have withdrawn their wool from treatment under it since its initiation. It is clear that the man who only shears 1,500 sheep cannot afford to pay fees for skilled classing. Under ordinary arrangements his clip goes into the market under the severe handicap of being unclassed. This was one of the reasons that induced the department to institute this measure of protection for the small flock man. Delay in getting the wool to the sales is sometimes unavoidable, owing chiefly to the lack of uniform types to make up an attractive and saleable parcel. In order that the consignors may not suffer through delay, an advance against the consignment is at once paid and the balance is subsequently equitably adjusted. As the Department works on a margin of 40 per cent. of profitable market value, it is able to make the first valuation on a fairly liberal scale, and the first advance to the farmer a correspondingly high one. The whole scheme is thoroughly effective and is appreciated by the small flock owner who, under it, is assured of a fair deal and a prompt realisation of his clip.

Agricultural Education.

In agricultural education and organisation, the most important consideration is the evolving of a system under which the number engaged in productive agriculture is increased and sound practice becomes more and more a feature of primary industry. Some time ago the Senate of the Queensland University appointed a special committee to report upon a proposal to establish a Diploma in Agriculture. This committee has now presented to the Senate a comprehensive report on agricultural education, containing practical suggestions for its extension in this State. The committee is of the opinion that transition from the school to intelligent service, and later to independent responsible work, should be natural and automatic. This general statement is epitomised in two urgent requirements—(*a*) An organised and controlled system of agricultural studentship; (*b*) provision in the State land laws and departmental policy whereby trained agricultural students may become the preferred lessees or owners of State agricultural lands. Existing rural schools and high schools would be allied with the general scheme. The suggested diploma course, the examinations for which would be conducted by the University, would cover sound technical and scientific training. The proposals embodied in the report are practical and workable, and their application should be well within reach. The close interest taken in rural affairs by the highest educational authority in the State is sure to have a big beneficial influence on Queensland's agricultural future.

The Country's Contribution to the Common Wealth.

Australia is the greatest wool-producing country in the world; it produces cattle and meat of the highest quality; its wheat, being a hard, high-grade type, is much sought after by the world's millers; in maize production per acre it has established a world's record; its dairy products are second in quality to none within the universe; and it can produce temperate and tropical fruits of quality which no other land can excel. All this is due to the energy, enterprise, and resource of the primary producer, and here are the figures showing the country's contribution to the common wealth for one year:—

Fruit	£6,471,382
Vine products	2,792,771
Farm yard and dairy produce	44,416,854
Hay	18,172,462
Wheat	35,154,664
Agricultural products	81,889,700
Pastoral products	69,269,952
Barley	1,139,730
Maize	1,977,986
Oats	2,007,992
Potatoes	2,104,771
Bacon and hams	3,581,716
Butter	18,812,768
Cheese	1,435,777

A table of national production like that serves to emphasise the rural producer's importance in the community—an importance often underestimated by urban interests—it serves as a reminder that, to the rural producer is due Australia's present eminence among the world's producing nations.

IRRIGATION IN QUEENSLAND—V.

H. E. A. EKLUND, late Hydraulic Engineer, Queensland Water Supply Department.

The first of this series, an historical note, commenced in the July Journal. Irrigation on the Lower Burdekin was reviewed in the August number, and the instalment in the following issue covered irrigation in the West. In the October Journal practical considerations were discussed. The review will be continued through succeeding issues.—Ed.

SURFACE SUPPLIES.

I.—Available Supplies.

A farmer having convenient access to a good and reliable surface water supply, suitable and ample for irrigation, is particularly fortunate. He is almost criminally negligent if he fails to take full advantage of it. The question of plant and machinery in such a case is purely a question of getting ample power to supply the quantity needed, the more difficult and serious question of finding water being already solved.

The thrifty farmer does not delay the planting of a crop until his barn is empty. Nor should he delay the consideration of irrigation until a drought sets in. Preparing land for irrigation, obtaining suitable plant, and learning how to use it, takes time. A drought may commence any day and may do great damage, but the benefit of water judiciously applied when wanted will not be spoiled by a possible rainfall just after an irrigation. The safest plan to follow is to be prepared, and ready to cope with any emergency.

The system of irrigation to be adopted depends, primarily, on the general configuration of the ground. If this is very uneven it may pay better to use a spray system than to attempt grading or terracing. At the other extreme, if the ground is quite level the spray system may again be better than flooding; the crop to be grown in this case being the governing factor.

From the table showing the number of gallons required to give any desired number of acre inches, an idea of the horse-power required may be obtained. The power required is found by multiplying the weight of the water to be lifted per minute by feet lifted and the product so obtained divided by 33,000 gives the theoretical horse-power. Say, for example, that it is desired to raise sufficient water to apply one and a half inches per acre per hour. This corresponds to four and nine-sixteenths inches over a weir 2 feet wide, and is equal to 562 gallons per minute. If the lift from the surface of the water supply to point of delivery is 40 feet, we have:—

Horse-power =

$$\frac{\underset{\text{G.P.M.}}{562} \times \underset{\text{weight of one gallon of water}}{10} \times \underset{\text{height of lift}}{40}}{33000} = 7\cdot1 \text{ H.P.}$$

This is the theoretical power wanted, but in order to allow for friction in piping and efficiency* of pump the theoretical power must be increased. The amount of increase necessary will depend on local conditions such as the distance from centre of pump to water level, or "suction head," height from pump to discharge, or "discharge head," and the length of piping from pump to discharge. In all cases it is advisable to keep the pump as close to the water source as practicable in order to reduce the suction head.

* The term "efficiency" is the ratio of power applied to work done and is expressed thus: $\frac{\text{output}}{\text{input}}$ = efficiency. If the actual break horse-power developed by an engine driving a pump is found to be 10, and the weight of water pumped × by the height lifted ÷ 3300 = 7 H.P. This latter H.P. is termed water horse-power, and the efficiency of the pump is given by $\frac{\text{water horse-power}}{\text{break horse-power}}$ after making corrections for friction. In this case the efficiency of the pump would be seven-tenths or 70 per cent.

As the figure expressing the efficiency of any machine is always less than 1, it is perhaps difficult to understand why it is not called *deficiency*; which term would, to some extent, be self-explanatory.

The distance that a pump can lift water by suction is strictly limited. It depends on the atmospheric pressure at any place, and under best conditions attainable in actual practice is not likely to exceed 25 feet at sea level. The higher the altitude the lower will be the column that can be lifted by suction (see Table).

Friction of water in pipes varies:—(1) Directly as the length of the pipe; (2) increases with the roughness of the interior surface of pipe; (3) decreases as the diameter of the pipe increases; (4) increases nearly as the square of the velocity; (5) is dependent on the pressure of water.

Table VI. gives the frictional resistance, converted to feet head, in new and fairly smooth pipes, and the velocity at which water in the pipe must move to give the rated discharge. It is clearly not good economy to have the pipe too small, as the work required to overcome friction is a constant and unnecessary absorber of energy. It is equally unwise to go to the other extreme and a happy medium should be aimed at. Where pumping has to be continuous the velocity in the pipe should not exceed 3 feet per second, but a velocity of 5 feet per second, or even more, is not seriously objectionable if the pipe line is short and pumping intermittent, such as would be the case in irrigation.

Bends should be avoided as they tend to increase friction. The result of recent research in this direction, published in "Engineering News," Vol. 68, No. 14, p. 382, may be summarised as follows:—

1. The excess loss* of head in bends is greater for large pipes than for small pipes.

2. For large pipes a 6 feet radius bend gives the least resistance unless very long radii are used. If very long radii can be used the least resistance will evidently be from the longest radius.

3. For small pipes, at least, with long radii, the loss of head will be less than it would be in a straight pipe of a length equal to the tangents of the curve. This occurs when the saving in friction head, due to shorter line, becomes greater than the excess loss due to the bend.

Vertical bends are particularly obnoxious unless special precautions are taken. Collections of air at the top of a vertical bend will cause the pipe at that place to burst very frequently unless the line is straightened, or an air valve put in.

Assuming that the total length of the pipe line in the case under consideration is to be 1,500 feet, the table is examined to ascertain the most suitable size. A 7-inch pipe gives 580 gallons per minute at a velocity of 5.8 feet per second; the friction head being 1.93 per 100 feet. An 8-inch pipe 574 gallons, at a velocity of 4.4 feet, and a friction head of 1.02 feet; and a 9-inch pipe 562 gallons at 3.4 feet per second, with a friction head of only .567 feet per 100 feet of length. Total friction head in each case respectively is, therefore, $1.93 \times 15 = 28.95$; $1.02 \times 15 = 15.3$; and $.567 \times 15 = 8.5$. The power required to overcome this friction head is approximately 5.2 horse-power, 2.6 horse-power, and 1.4 horse-power respectively. The lesser first cost of 8-inch piping as compared with 9-inch will probably justify the adoption of 8-inch pipe, while the use of 7-inch pipe would considerably increase the first cost of the engine as well as cause a largely increased cost of maintenance.

The next step is to ascertain the efficiency of the pump to be used. Assuming a guaranteed efficiency of 65 per cent. for the pump, the necessary horse-power is obtained thus:—

$$\text{Horse-power} = \frac{\overset{\text{Volume wanted}}{662} \times \overset{\text{head}}{40} + \overset{\text{friction head}}{15{\cdot}3} \times \overset{\text{weight of 1 gall.}}{10}}{33000} \times \frac{\overset{\text{efficiency of pump}}{100}}{65}$$

$$= 14{\cdot}5 \text{ H.P.}$$

Where it is proposed to use a spray system of irrigation the pressure recommended by the makers for a satisfactory working of the spray must be converted from pounds per square inch to feet head and so added to the lift in feet. In spray systems of irrigation very careful designing is essential or the result is certain to be unsatisfactory.

If the water has also to be conveyed by open drain after pumping, an additional quantity, depending on the length of the ditch and quality of the soil, has to be pumped, to allow for seepage. This may be accomplished by pumping for a longer period, but it is not to be recommended, as small quantities or "heads" are not conducive to economy of time and labour in applying water to the crop.

* Friction in a bend is greater than the friction in a similar length of straight pipe. The difference constitutes "excess loss."

The area that one man can irrigate with a given quantity of water is approximately indicated below:—

Volume supplied from Pump or Ditch in Gallons per Minute	AREA COVERED IN ONE DAY AT A DEPTH OF—			
	3 Acre Inches.	4 Acre Inches.	5 Acre Inches.	6 Acre Inches.
200	1 — 1½	¾ — 1	1 — ..	¾ — ..
400	1½ — 2½	1 — 2	1¼ — 1¾	1 — 1½
600	3 — 4	2 — 3½	1¾ — 2½	1¼ — 2
800	4 — 6	3½ — 5	2½ — 3½	2 — 3
1,000	5 — 7	5 — 6	3½ — 4½	3 — 4

CHOICE OF PUMP.

The essentials of a pump suitable for irrigation are cheapness, reliability and efficiency. The centrifugal pump combines these features perhaps rather more than any other type, and is in addition very simple. It is durable and requires but little attention, while its efficiency, *when designed for the lift at which it is to operate*, is good. It is, however, a very easy matter to get a centrifugal pump particularly wasteful of energy, and every purchaser should, therefore, insist on a guaranteed efficiency to be fulfilled by test after installation, under supervision by some competent authority.

There are two types of centrifugal pumps—the turbine and the volute. The volute pump takes its name from the shape of the casing and it is usually a single stage pump, but volute pumps may be arranged to operate in series. The turbine pump originally differed from the design of the volute in having guide vanes on the casing somewhat similar to the water turbine. The designation is now applied to any pump having a concentric casing. Good efficiencies are obtained in both types, but the turbine type lends itself more readily to compactness and is, therefore, usually favoured where a multistage pump is necessary.

Either type consists of a shell within which revolves the impeller mounted on a shaft and carried by bearings. The water to be pumped enters at the centre from which it is forced by the action of the impeller. The energy thus imparted to the water creates pressure as a result of the velocity at which the water leaves the vanes of the impeller. The theoretical head against which a pump can deliver, therefore, depends on the velocity at which the impeller revolves; this limit being fixed by the design of the impeller.

In Figure 26 the component parts of a centrifugal pump are shown.

The quantity that any given pump can deliver against a certain head is termed its capacity. This is usually stated in gallons per minute. Makers of centrifugal pumps are usually willing to furnish diagrams showing the characteristics of the pumps which they recommend. In every case when a pump is purchased such a diagram should be insisted upon, if not voluntarily offered, so that the purchaser can, after installation and at any future date, check the performance of the pump.

Sometimes pumps may not be all that they are represented to be, but more often they are operating under conditions for which they were never intended. Many people are quite satisfied that the installing of a centrifugal pump is such a simple process that no advice is necessary. It is not until such an installation proves troublesome that an engineer is asked to investigate. The best conditions of operation of any centrifugal pump can only be determined by experiment unless the makers' diagram is available; in which case an error in the installation relating to head, or speed, or both, becomes fairly obvious. If these particulars are not available the determination of correct conditions for operation may be a tedious process and proportionately expensive.

As a useful approximation for obtaining the peripheral speed of the impeller in feet per second, take the square root of the total head, including friction, and

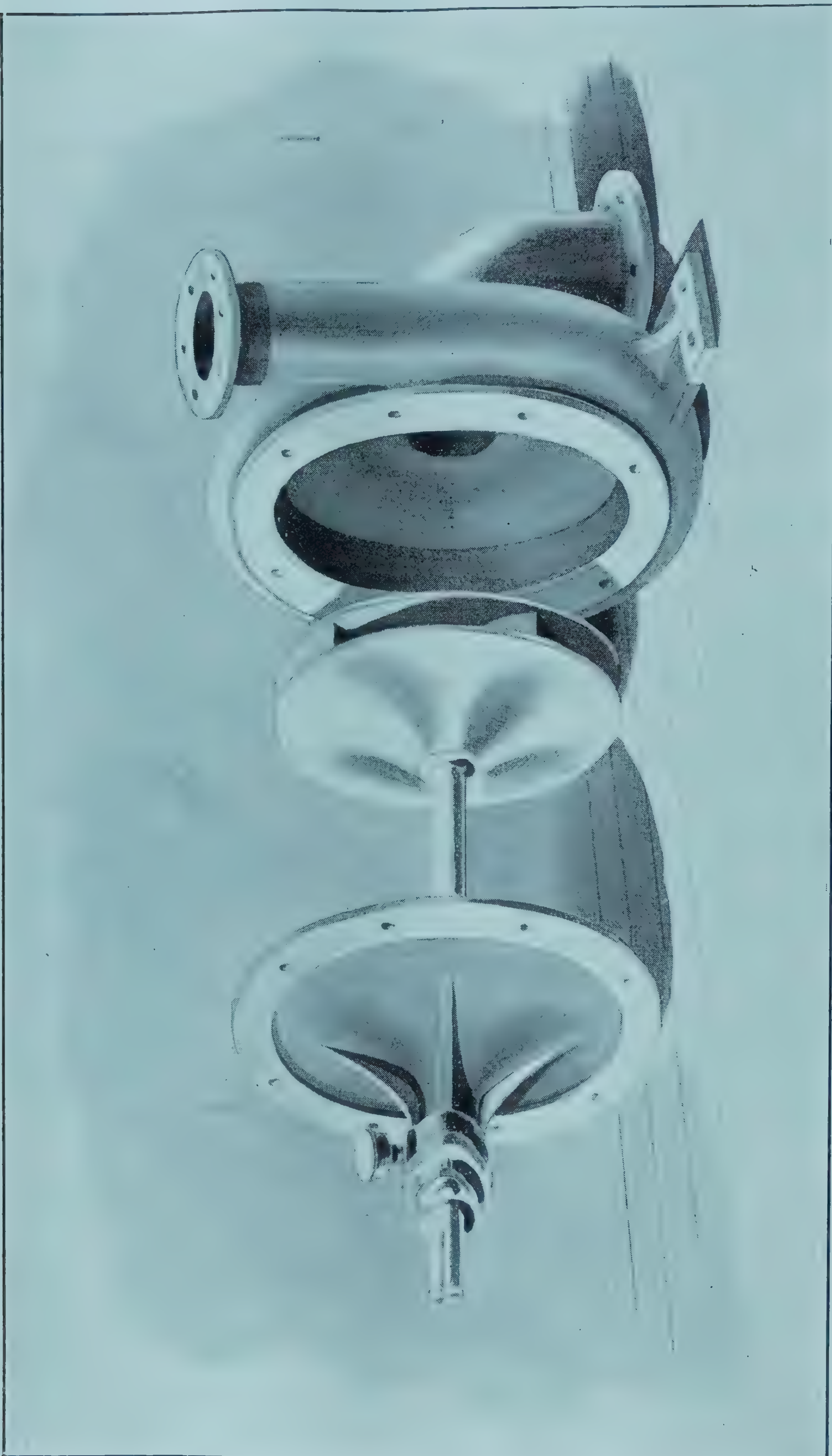

Fig. 26.—Centrifugal Pump Dismantled.

multiply this by 8. So that if total head plus friction is 64 feet the perpipheral speed of the impeller should be 64 feet per second. If the impeller is 8 inches in diameter the circumference is 8 × 3.1415 = 25.1 inches = 2.1 feet nearly. Hence the speed should be about 30 revolutions per second, or 1,800 revolutions per minute.*

Altering the speed of a centrifugal pump almost invariably means a change of pulleys. To get the correct speed take the rated speed of the pump multiplied by the size of the pulley supplied with it. This product divided by the speed of the engine will give the diameter of the driving pulley. If it is desirable to use the fly wheel of an engine as driving pulley, multiply the diameter of the fly wheel by its speed and divide by the speed of the pump. The result is the diameter of the pulley for the pump. It must, of course, be noted that all dimensions should be in the same unit, say inches, and the speed in revolutions per minute. In all cases where similar speed calculations are made it is easy to remember that driving speed × driving pulley = driven speed × driven pulley, and from this any one of the four can be found, the other three being known, thus:

1. $\dfrac{\text{Driving speed} \times \text{driving pulley}}{\text{driven speed.}} = \text{driven pulley.}$

2. $\dfrac{\text{Driving speed} \times \text{driving pulley}}{\text{driven pulley.}} = \text{driven speed.}$

3. $\dfrac{\text{Driven speed} \times \text{driven pulley}}{\text{driving speed.}} = \text{driving pulley.}$

4. $\dfrac{\text{Driven speed} \times \text{driven pulley}}{\text{driving pulley.}} = \text{driving speed.}$

Special centrifugal pumps designed for high efficiency under certain fixed conditions are, as a rule, not suitable for pumping from an open river where the water level may vary very considerably. In order to ensure satisfaction a prospective purchaser should approach makers of centrifugal pumps, fully stating the particulars necessary for their information as tabulated in Appendix I. Whilst urgent requirements may be supplied from agent's stock, it will be found more satisfactory to get pumps which are specially designed for the conditions under which they are to operate. There are quite a number of makers within the Commonwealth, and competition will ensure that the prices are as good as those of the imported article. The quality of some Australian-made pumps leaves nothing to be desired, and the writer is acquainted with cases where Australian-made pumps showed a better efficiency and capacity than similar imported pumps.

The pump diagram given in Figure 27 is of a standard American pump. An examination of this will show that the efficiency of the pump lies between 70 and 80 per cent. for a very wide range of capacity, and a large fluctuation in head. This pump has been designed to give a good efficiency at constant speed against a variable head. Such a pump is well suited for irrigation work, and this diagram may be compared with diagrams in Figures 29 and 30 which show the characteristics of some Australian-made pumps.

The principal features of the curves are very similar, and it is quite clear that Australian makers can at least hold their own in this respect.

It will be noted in all the curves that as the head decreases the capacity increases, and *vice versâ*; speed remaining constant. If the actual head is greater than that for which the pump was designed less water will be discharged; if the head

---

* The rule here given is founded on the equation—

$$V_2 = \theta\sqrt{2gh}$$

where $V_2 = 2\pi\Gamma_2 \dfrac{N}{60}$.

Various authorities give the value of θ as follows :—

Blaine 1 to 1·3.
Dougherty ·95 to 1·09 for impending delivery,
and ·9 to 1·30 for maximum efficiency.
Sargent ·90 "for small discharges,"
1·10 for large discharges.

As the square root of $2g$ is 8·02, a value of unity for θ appears assumed in the above rate. It is evident that the result obtained by the formulæ is likely to be rather high for pump of "small discharge," and correspondingly low for "large discharges."

is less, more water will be delivered. The former condition is likely to prove serious, but the latter condition can always be controlled by throttling the flow and so getting the normal discharge.

The most important feature to observe in any pump diagram when the pump has to work against a variable head is to see that the break horse-power curve reaches its maximum when the efficiency curve is highest. This point naturally should occur when the pump is working under conditions for which it was designed. Pumps not designed for a variable head may show a stead rise in the H.P. curve after

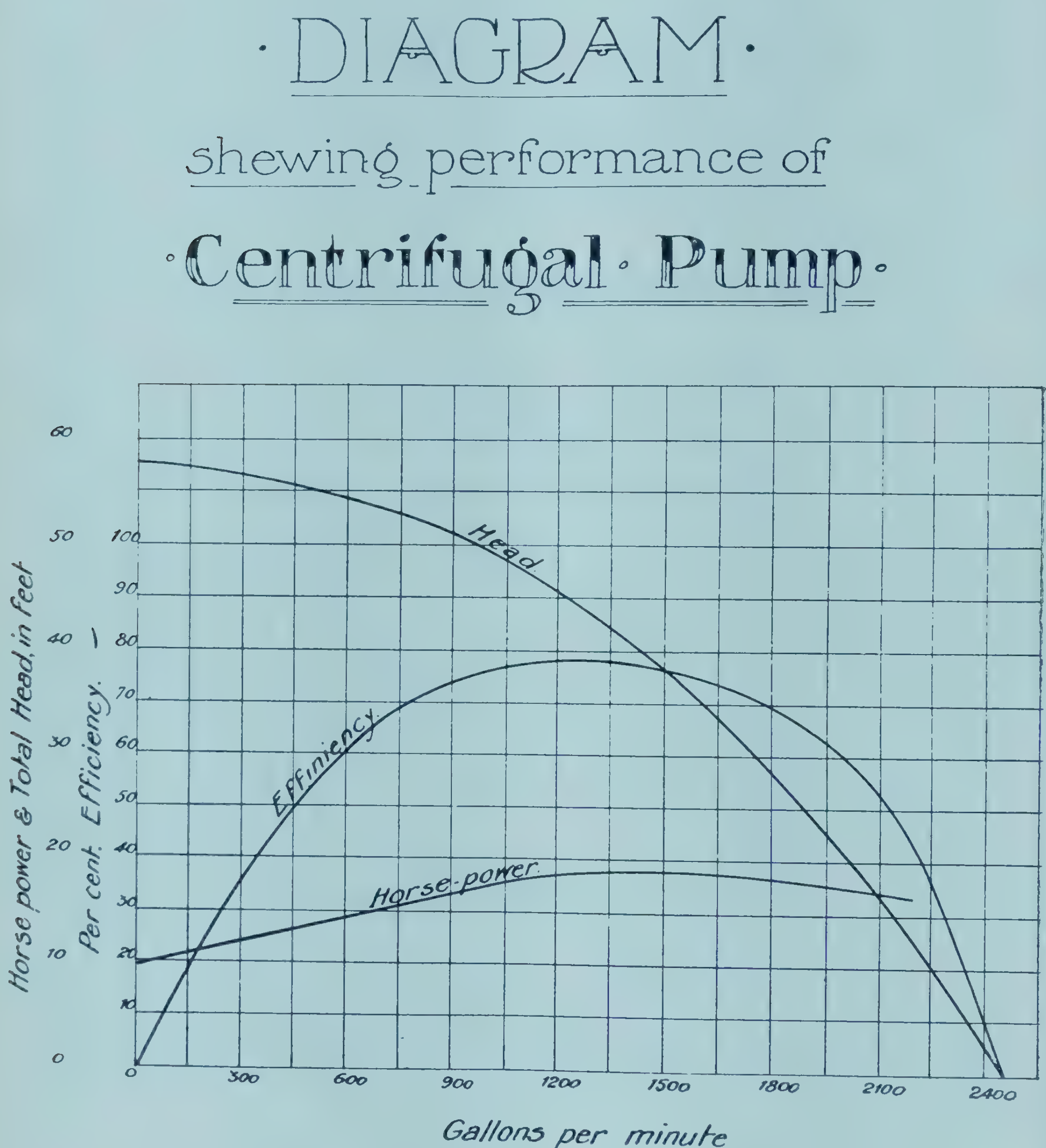

Fig. 27

the maximum efficiency has been reached, owing to an increase in the capacity due to a reduction in head. (See Figure 28.) Though this condition may be met by throttling the flow it is not a desirable feature. It is prohibitive where the motive power is an electric motor, and objectionable where an oil engine is used.

The only practical drawback to the centrifugal pump is that since it cannot lift water by suction unless its casing is filled with water it needs priming. There are many ways of doing this—as, for instance (1) by a small hand pump; (2) by having a foot valve on the suction end and some means of filling the pump by water,

either by hand pump or an overhead water tank; (3) where steam is used a flap is hung on the discharge end and an extractor steam nozzle is connected to the discharge main and supplied with steam from the boiler. (In the sugar-growing districts of this State the ejector is called "inspirator" as having reference to the drawing in of the water.)

In operating a centrifugal pump the precautions to be observed are—

1. Oil pump bearings well before starting, and if these are provided with grease cups examine these and refill if necessary.

2. See that the impeller revolves freely before starting.

·DIAGRAM·

shewing performance of

·Centrifugal · Pump·

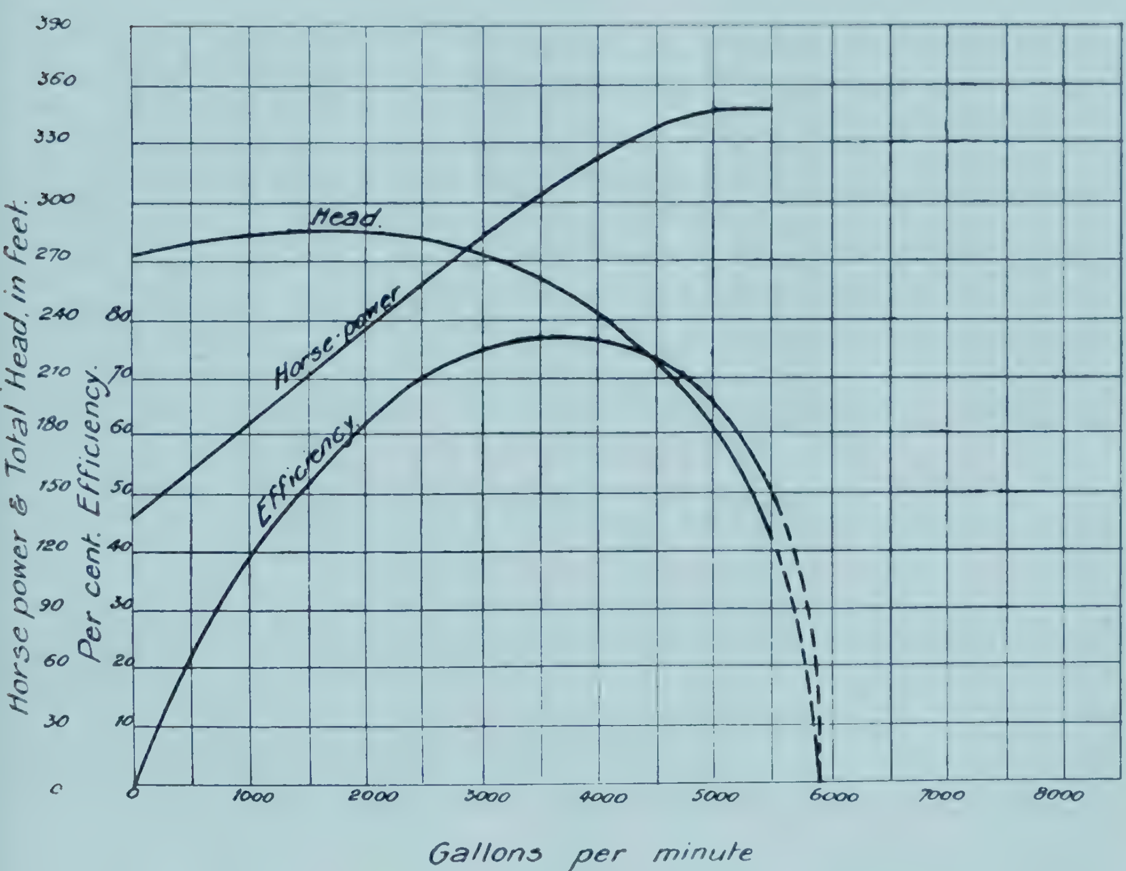

Fig 28

3. Do not draw up the packing glands so as to pinch the shaft. A small leakage, amounting to just a weep, will do no harm while it will help to keep the bearing cool and prevent seizure.

4. Do not start the pump until the casing is well filled with water, and if the suction exceeds 10 feet the water in the discharge pipe should be as many feet above the pump as the water level is below 10 feet to ensure a good start.

5. Do not run the pump empty.

6. In running the pump, remember that overspeeding gives less loss of efficiency than under-speeding, but every endeavour should always be made to maintain the correct speed.

7. The larger the pump the better should be the efficiency. Small pumps may give from 40 to 50 per cent. efficiency, whilst large pumps sometimes show over 75 or even 80 per cent. (See Table XI. for capacities and speeds.)

Test Curves for Pump.

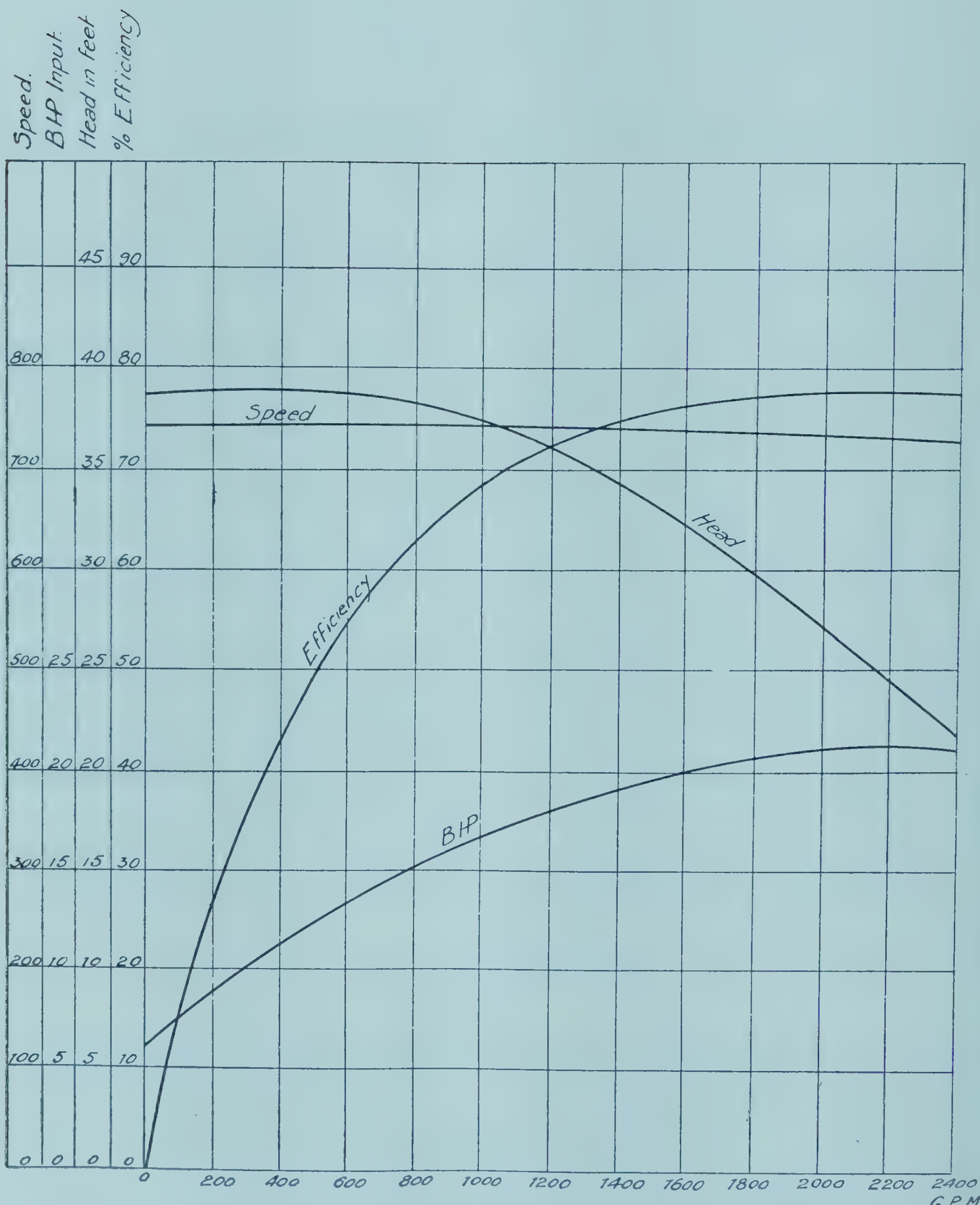

Fig 29.

II.—Stored Supplies.

Where it is necessary to store or conserve water to provide a supply for irrigation, the undertaking may easily be too costly to be profitable for the individual farmer. It is here that the legislative measures of the Water Rights Act of 1910 provide for a special benefit.

There exist, however, many places in Queensland where the natural facilities are such that but very little labour is needed to ensure a good supply. Any such contemplated improvement should, however, be approached with a certain amount of caution, as enthusiasts are liable to overrate the practical utility of any natural facilities that exist.

The following notes are made as a guide to the farmer in getting an idea of the amount of storage necessary to tide him over a bad period, where such storage is his only hope. It is not recommended that any actual work be undertaken without advice by some competent engineer, having had experience in water conservation work.

In the first place the least amount that could be depended upon to raise a crop, rainfall included, is about 30 inches of water per acre per annum. To allow for evaporation and seepage it will be best to take it that this quantity has to be provided by the stored supply only; the rainfall being neglected for purposes of arriving at a safe estimate of the quantity of stored water needed.

Taking, say, 50 acres as the amount of land for which it is desired to provide a supply sufficient for irrigation, it will be interesting to make some comparison as to the bulk of water required. One acre foot, it will be noted from tables that will follow the final instalment of this series, is equal to 43,560 cubic feet. An ordinary six-roomed house, if filled with water, would contain about one-quarter of this amount. If it were put into a cube just large enough to contain it, this cube would measure just over 35 feet each way. The actual supply required for one year is 150 times this amount, and as droughts sometimes last for more than eighteen months it is best to consider that a two years' supply may be needed. A two years' supply at three acre feet per acre for 50 acres is 300 acre feet, or 13,670,000 cubic feet. The size of a cube containing this amount of water would measure roughly 505 feet each way. If a dam 20 feet in height is put across a creek 100 feet wide (the banks being even and steep) and the water backs up along the creek for three miles, the contents of this dam, when full, will be a little more than 360 acre feet, or a sufficient quantity for 60 acres on basis of above estimate of requirements. Such a dam would require about 4,500 cubic yards of earth for its construction, and the cost may be anything from £500, at the least, to perhaps £1,500 at the most. Putting down £800 for an engine and pump and another £300 to £500 for piping and other things needed, we have an amount somewhere between £1,600 and £2,800 as the probable cost of providing a supply for 60 acres, if facilities are good and material needed for construction handy.

The interest on the greater of these amounts at 7 per cent. is £196 per annum, or nearly £4 per week. When a fluctuating market, transportation, agents' fees, working expenses and maintenance are considered, there is nothing particularly fascinating about such a proposition to the individual.

But irrigation is intense culture and 20 acres well looked after can probably be made to yield as much profit as 60 acres indifferently tilled. It will be worth while, therefore, to look at this proposition from another point of view. Say that three farmers are so situated that they could each in turn take advantage of the supply and plant. The cost to each would, in such a case as stated above, be less than £1,000. Again, if the works and machinery were constructed on the principle of Water Supply Areas under the Water Rights Act of 1910, the annual liability to the Crown of each participant in the scheme would only be an amount of interest and sinking fund depending on the period fixed for redemption of the loan plus his share of the maintenance and working expenses. The period is determined by the probable life of the works, and assuming that this could be put down at twenty-eight years, interest and sinking fund would amount to 6 per cent. per annum. If the period were fixed at less than this time the annual payments would, of course, be larger; but the total cost to the shareholders would be less on account of the reduction in time during which he has to pay interest. The machinery necessary could hardly be expected to last twenty-eight years even if the rest of the work might. The period may, therefore, have to be divided according to the class of work it covers, and in addition a renewal fund should be provided so that the machinery could be renewed without the necessity for having to obtain another loan.

It is just here that a little further caution may be necessary. The Victorian Settlement (Mildura), although situated on a river (where water transport was and is in operation), suffered considerably from a lack of rapid transportation facilities. If the farmers' cost of transport is high, it is necessary, therefore, to consider whether intense culture is going to pay him or the produce merchant or the

railways best. When rural communities are organised on co-operative lines and agents' fees obviated, there will probably be money to spare for experiments. It is chiefly due to the strength of the co-operative body in Mildura that the producers have received rather more than the usual pittance for their labours. In Queensland it is not uncommon to hear the farmer complaining that he has received only between 10 and 50 per cent. of the price that the consumer pays. If this is so, it would be interesting to know where the balance goes; but as this is a matter that concerns the farmer most, it is, as the American says "Up to him."

The next instalment will deal with "The Duty of Water."

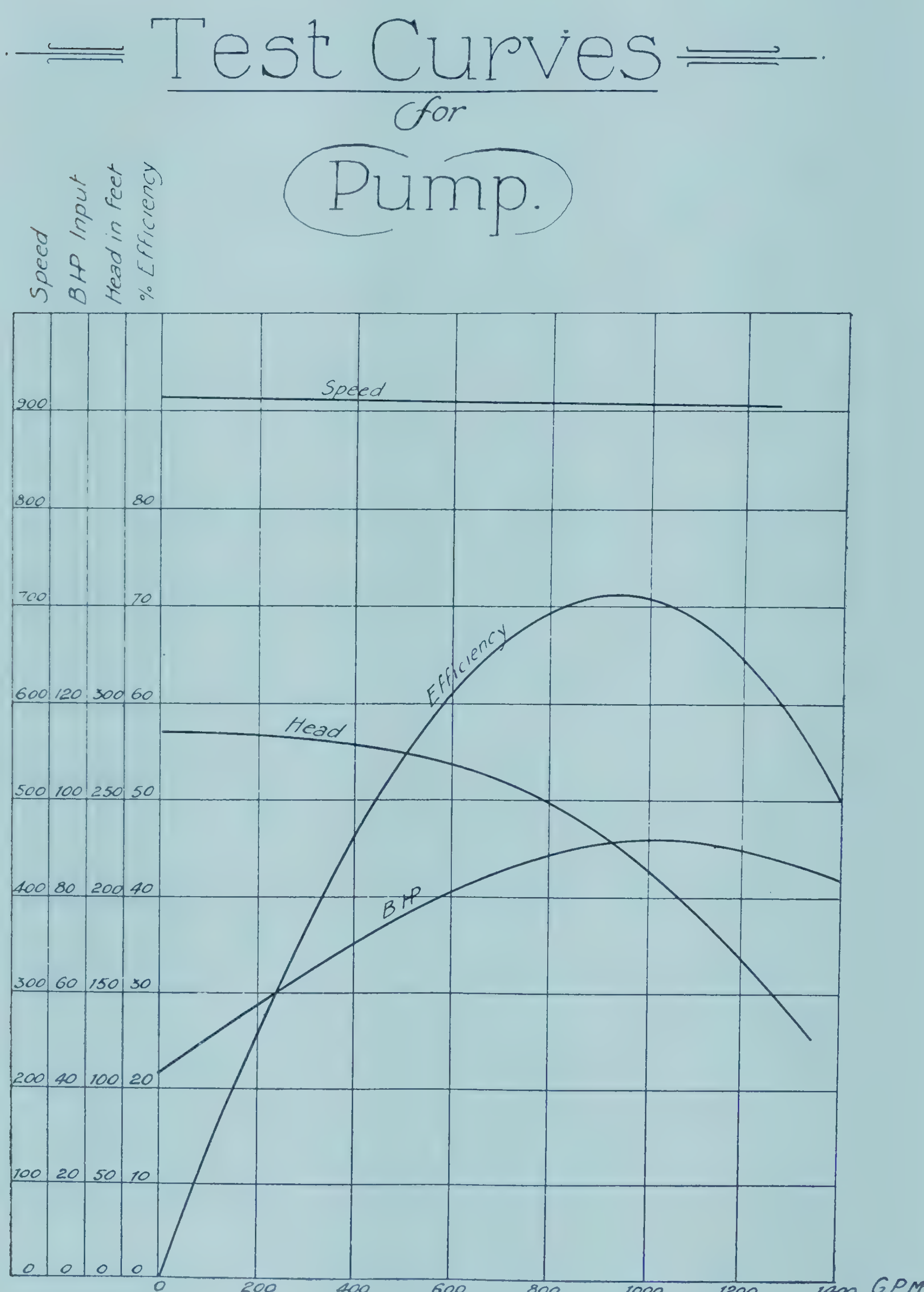

Fig. 30

CLASSIFICATION OF PIGS.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

The first of a series of articles on pig breeding and feeding, and covering other points in practical animal husbandry.

To secure the maximum profit in the marketing of pigs it is necessary that they be properly fattened on suitable fattening foods, that they be "topped up" prior to actual despatch, and that they be correctly classified and graded.

The following table which sets forth the names, ages, approximate weight and value of market pigs will be found very useful in connection with the preparation for market or for the factory of every description of pig which the farmer will be handling in this State. The figures given are approximate only and are quoted merely as a guide. The demand for pigs of all ages and classes is rapidly increasing, and whilst values fluctuate a good deal, it can be taken as a general rule that the medium weight animal, whether he be marketed as a porker or bacon pig, is the one most in demand and under normal conditions is the most profitable.

MARKET CLASSIFICATION.

Name of Animal.	Approximate Age.	Approximate Weight.	Approximate Value November, 1923.
Sucker or Sucking Pig	6 weeks	15 lb. dressed	12s. 6d. to 15s.
Weaner	8 weeks	25 lb. alive	15s. to 20s.
Slip	10 weeks	32 lb. alive	20s. to 25s.
Store	12 to 16 weeks	45 lb. alive	20s. to 36s.
Light Porker ..	4 months	50 lb. dressed	40s. to 55s.
Medium Porker ..	4½ to 5 months	70 lb. dressed	50s. to 75s.
Heavy Porker ..	5½ to 6½ months	95 lb. dressed	65s. to 80s.
Light Baconer ..	5½ to 6½ months	95 to 100 lb. dressed	65s. to 80s.
Medium Baconer ..	6 to 7 months	120 to 125 lb. dressed	85s. to 95s.
Heavy Baconer ..	7 to 10 months	Up to 180 lb. dressed	90s. to 125s.
Backfatter	Up to 7 years	Up to 5 cwt. dressed	Up to £15
Stag	Up to 5 years	Up to 4 cwt. dressed	£3 to £5
Boars	Over 6 months	Various weights	From £1 upwards
Choppers	Up to 2 years or more	Up to 3 cwt. dressed or more	Up to £10

GENERAL DESCRIPTION OF MARKET AND STUD PIGS.

Sucker or Sucking Pigs.

This is a trade class and includes pigs up to six or even eight weeks old, in good marketable condition, and fit for immediate slaughter as "sucking pig" for the week-end or Christmas menu. The demand for this class varies considerably, and is not sufficiently constant to warrant being specially catered for by the average farmer. Pig breeders having this class of pig for sale at Christmas can usually dispose of them at remunerative prices with but little trouble. The most popular weight is 15 lb. dressed, although some customers ask for lighter or heavier weight carcases. In general the difference between actual live and dressed weight varies from about 18 to 25 per cent., though most factories find it necessary to deduct heavier percentages than these in ordinary routine work.

Weaners.

Pigs are usually weaned off the sows at eight weeks of age. At this age they are sufficiently advanced (or at least they should be) to be able to care for themselves. They should be taught to feed from a trough when five to six weeks old, they will then be quite accustomed to their own food trough by the time they leave their mothers. Weaners are not a "trade" class, and butchers do not handle them except as "stores."

Slips.

After having been weaned, the young pig next becomes a "slip." This is purely a stock salesman's term indicating that the pig is midway between the weaner and store stage. Many farmers prefer to buy slips or stores and to fatten

them for market in preference to breeding them. Thus it is that there is usually a fairly keen demand for slips and stores, and it often happens that they realise more in comparison than pigs that have already been fattened. A "slip" is not a butcher's pig and butchers do not handle them except for sty purposes. The price varies with the demand, but they should be worth from 20s. to 25s. if they have been well cared for from birth and are well bred.

Stores.

The demand for pigs for fattening purposes continues to increase annually, and provided that store pigs are in good healthy growing condition and show some breeding and quality, they can usually be disposed of to advantage by public auction or private contract at prices varying from 20s. to 30s. or even 40s. each. Store pigs to realise the maximum value must be perfectly healthy, show good quality and type, and be in good condition for fattening; any that are "weedy" or that have been injured in any way should not be offered for sale as they will always affect the value of the other pigs offered or of the better class pigs. Suburban pig farmers are constantly on the look out for good lines of store pigs. They have no objection to the size or age of the pigs, except that they will not handle weaners or slips if larger pigs are available, and the stores they like most are those from five to six months old that with three or four weeks' fattening will "make up" into first-class baconers. For these latter sorts they will frequently pay more in comparison than the farmer can realise for porkers.

Light Porkers.

Pigs varying from four to six months old are usually classed as porkers, and they are graded according to weight and condition into three groups—light, medium, and heavy. There is a fairly constant demand for porkers and they usually realise very satisfactory prices, but it is a mistake to send porkers to the bacon factory and expect the factory manager to grade them as bacon pigs and pay for them accordingly. Porkers should be sold to buyers handling these lines. If they are properly handled they should be more profitable than bacon pigs, as they are ready for market much earlier and consequently can be produced at a cheaper rate and with less risk. The lighter grades of porkers, say, those dressing about 50 lb. weight, are not as profitable as the medium weight pigs, except to the suburban farmer who can deliver them to the saleyards or to the buyers in a fresh, clean condition. Porkers cannot stand knocking about to the same extent as pigs carrying more age and weight. To the farmer having porkers for sale, the best advice would be to spend some time moving about amongst pork butchers or buyers or stock agents, ascertaining the exact position regarding the market outlet for these animals.

Medium Weight Porkers.

For pigs of prime quality and condition weighing about 65 to 70 lb. dressed there is, especially during the cooler months of the year, a good demand; they are more profitable than either the lighter or the heavier grades, and provided that they are in good healthy condition will always realise payable prices. Butchers prefer porkers weighing 65 lb. dressed if they can secure them because they are of a convenient and handy "shop" size, and can be "cut up" to more advantage than other grades. Porkers are, of course, used in the fresh meat business, being retailed in the form of small joints of fresh pork, pork chops, and other forms. Many farmers believe that the bacon curer can do with a few porkers to cut up for the sausage trade, but this is not the case as bacon factory reports will bear out.

Heavy Porkers.

For these the demand is not so keen, nor are prices so satisfactory. Altogether they are not as good for marketing purposes as are the medium weight porkers or the better grades of bacon pigs. There are times, of course, when heavy porkers sell well, particularly if one or more of the carcase butchers have heavy export orders for carcase pork for the Navy or for pickled pork for the "Island" trade. In general, however, it can be said that the heavy porker is not in demand; he had better be fed for a month longer and be marketed as a baconer in which class he will realise a price that will more than pay for his keep for the extra period. This is a point far too many farmers fail to realise, the general complaint amongst bacon curers to-day is that the farmers are rushing their pigs into market before they are heavy enough or carry sufficient condition for curing.

PLATE 89.—A GROUP OF SLIPS.
The Berk-Yorkshire type enjoying the run of an open paddock.

PLATE 90.
What can be done by care and attention to an "orphan" pig, for brood sows sometimes have trouble at farrowing and are unable to rear their suckers.

Bacon Pigs—Light, Medium, and Heavy.

As with porkers, the demand for bacon pigs centres more upon the medium weight pigs than upon the lighter or heavier grades. In fact, the very light bacon pig, like the over-weight porker, is not desired. A pig that is too heavy for the pork butcher, yet not heavy enough for the bacon curer, is in a class that is likely to suffer more on a falling market than any other grade, therefore breeders should aim at placing their bacon pigs on the market when they are six to seven months old, and about 120 to 125 lb. dressed weight. The bacon curers prefer a pig of this size because he can be retailed more profitably in the form of hams, shoulders, flitches, middles, or sides. The heavy bacon pig is a better market animal than the heavy porker because the former carries a more weighty ham, but he is not as profitable "all round" as the pig of medium weight and should not be kept so long in the fattening pen. It must always be remembered that the pig is a greedy feeder, and so long as he is feeding he is either doing so at a profit or at a loss to his owner. It pays handsomely to watch the markets carefully and to place before buyers the class of stock most in demand. The demand for the bacon pig is keen, so much so, that bacon curers' have buyers or agents operating in practically every district throughout the State, the competition is so keen that the farmer need have no fear that his stock will not realise satisfactory values. Good pigs always realise good values.

Plate 91.—A Record-Priced Backfatter.
This sow realised £21 1s. at a Southern public auction.

Backfatters.

The term "backfatter" is used by pig men to indicate that the pig has passed the stage at which he can profitably be handled as a bacon pig, and that having passed that stage his carcase must be "cut up" into smaller pieces and be used in the manufacture of the variety of small goods for which the carcase of the pig is justly famous. The term "backfatter" also indicates that the pig is a very heavy one, and that he carries the greater portion of his fat on his back or on the upper portions of his body. Backfatters fluctuate in value more than any other grade of pig, and as a class they can fairly be considered as unprofitable; still the class embraces a variety of heavy pigs, old fat sows, barrows, and very heavy bacon pigs that for various reasons might not have been marketed earlier. It would not pay under ordinary circumstances to breed pigs for sale as backfatters, but it certainly pays to fatten up brood sows that have become unprofitable, either on account of age or because they are unsatisfactory as breeders; it pays to cull and fatten up any sow that fails to produce a satisfactory litter twice a year, therefore the backfatter class provides a suitable market outlet for old heavy pigs or for fat pigs over the ordinary market weights. The price varies considerably according to supply and demand and the quality and condition. During the past year or two prices have been paid for backfatters up to as high as £22 15s. This price having been paid for a fat sow for slaughter in New South Wales. Prices varying from £12 to £18 have been fairly common, and whilst these prices might be considered phenomenal, as indeed were prices for all descriptions of pigs last year, backfatters still realise very high figures.

PLATE 92.—BACONERS ON THE WAY TO THE FACTORY.

Note the fine quality and evenness of type. These pigs, though heavier than our markets require, are of a type much in demand throughout Queensland.

Stags.

Old sows are usually graded as backfatters, whilst old boars that have been castrated and fattened up are classed as "stags" and for them the demand is very limited. Stags are purchased for rendering-down mostly, the fat goes into the manufacture of lard, the lean meat goes to the sausage tub, and most of the heavy gristly skin (the shield and the wrinkly skin along the neck and sides) is cut away by the meat inspector and is condemned as unfit for human consumption. "Aged" stags rarely pay for the feed they consume.

Boars.

It does not pay to market old boars unless one has an abundant supply of very cheap food, they rarely realise more than from £1 to £3, and they will only realise these prices if they are comparatively prime and in good condition. Whether it would pay to castrate them and fatten and market as stags is a very debatable point and one that can only be answered by the owner. It would not pay to fatten them upon purchased foods unless the food was very cheap and the market rates of pigs reasonably high.

Choppers.

Pigs that are marketed in a half-fat condition and that are unsuited to the requirements of the pork butcher, or the bacon curer, or for use as backfatters, are usually classed as "choppers," the term indicating that they are purchased for chopping purposes; that is, the carcase is chopped up into a variety of pieces and is used either for export as salt pork or pickled pork, or is used in the manufacture of small goods. Choppers vary in price according to their weight, condition, and quality. The class includes all grades of pigs from light weight porkers to heavy backfatters, and provides a very useful market outlet for a variety of pigs that could not be marketed profitably in the classes for which they might otherwise be suited.

OTHER STOCK TERMS REFERRING TO PIGS.

Apart from the general classification of pigs for trade and market purposes, there is a breeding classification in which other terms are used to describe the pigs at different stages of growth.

Commencing at birth the young pig is variously known as a sucker, a pigling, a bonham, a piglet; or in a group, he is part of a farrow or litter.

The Yelt.

Having passed the sucker stage the young female pig is called a "Yelt" or "Gilt" until she has produced her first litter.

The Brood Sow.

Having produced a litter, the yelt now becomes one of the matrons of the herd, and is henceforth known as a brood sow or as a breeder or breeding sow.

The Male Pig.

The boar usually retains his title throughout life. The male is often termed the "hog," but in America all pigs are called "hogs" (*i.e.*, The Hog Industry); in fact, the Americans rarely use the term "pig" at all, and when they do use it, it is to describe suckers or very young stock. The boar does not actually begin his stud duties until he is ten to twelve months old, the sow also should be at this age before being mated.

The Barrow Pig.

A male pig castrated whilst young is styled a "barrow." In American literature again both boars, barrows, and sows at the age of about four or five months are styled "shoats," but here they are called "store" pigs, and the term is a general one including all grades; a group of store pigs often includes breeding sows in poor or rough condition, in fact the group might include any class of pig in poor or half-fat condition.

Runts.

The "runts" of a litter are the small weedy or weakly pigs. They often do not pay for rearing, as they require too much special care and attention.

Rickety Pigs.

Pigs that suffer as a result of a long train or steamer journey and that arrive at the saleyards or factories "down" in the hindquarter, or that are unable to walk, or that walk with difficulty, are usually styled "rickety" or "groggy" pigs. The term is an erroneous one so far as its reference to the disease called "rickets" is concerned, although pigs suffering from rickets exhibit much the same symptoms.

PLATE 93.—

Scrub or Mongrel Pigs—i.e., the "Razorback" of American Literature.

A scrub or mongrel is an animal of mixed or unknown breeding without any definite type or markings. Other terms used to describe mongrels are "bronchos," "razorbacks," "wild pigs," "bush pigs," etc.

Purebred, Pedigreed, or Stud Pigs.

An animal that is included in this class is one of pure breeding, representing a definite, recognised breed, both of whose parents were pure-bred animals of the same breed. To be classed as pure-bred, live stock must be either registered, eligible for registration, or (in the absence of public registry for that class) have such lineage that its pure breeding can be definitely proved and recorded. To be of good type and quality, the animal must be healthy, vigorous, and a creditable specimen of its breed; its breeding must be pure.

Thoroughbred.

In speaking of pigs the term "thoroughbred" means the same as pure-bred. In American and English literature the term "standard bred" is also largely used. This is a term that we rarely use at all, it refers to the pure-bred animal.

Plate 94.—"Hog Heaven." Enjoying a Dip.
Careful handling of Pigs in transit is of prime importance in relation to top market rates.

Crossbred.

This term applies to the progeny of pure-bred animals of different breeds: that is a Berkshire boar mated to a Tamworth sow produces crossbred pigs, both parents are pure-bred pigs but of different breeds. The crossbred pig is very popular as a "meat" pig, and is produced for market purposes in practically every district where pigs are bred. Crossbred males should be castrated, they should not be permitted in the herd as sires. The crossbred sow on the other hand makes an excellent breeding sow when mated to a pure-bred boar.

Grade.

This term differs from that referred to above, in that it is applied to the progeny of a pure-bred boar mated to a crossbred sow. Sometimes the term "grade" is used where the progeny are from parents whose breeding is pure, but whose pedigrees for various reasons have not been recorded. The offspring of a pure-bred boar and a grade sow is also a grade, but through progressive breeding becomes a higher or a better grade. When a Berkshire boar is mated to a crossbred Tamworth-Berkshire sow the progeny are called grades. A sow of the latter class mated back to a Berkshire boar frequently produces progeny to all appearances pure-breds; they are sometimes called three-quarter breds, having as it were three-quarters Berkshire and one-quarter Tamworth blood in their veins.

Next month's article will deal in detail with the characteristics of the Berkshire.

REPORT ON EGG-LAYING COMPETITION—QUEENSLAND AGRICULTURAL COLLEGE, SEPTEMBER, 1923.

The adverse winds during the month hampered the laying of the competition birds to a small extent. Rain was badly needed for producing the necessary green feed, milk thistles being substituted. The best scores for the month in the light breeds were W. and G. W. Hindes 163, and C. H. Singer 161. In the heavy breeds Mr. James Potter scored 151, and Mr. J. Ferguson 148. Mr. R. Burns's E. bird made a sequence of 37 eggs. The heavy breeds were very troublesome with broodiness; there were also a few cases among the light breeds. Records and weights:—

Competitors.	Breed.	Sept.	Total.
	LIGHT BREEDS.		
*C. H. Singer	White Leghorns	161	792
*W. and G. W. Hindes	Do.	163	770
*N. A. Singer	Do.	160	765
*Oakleigh Poultry Farm	Do.	147	700
*Ancona Club	Anconas	135	693
*S. L. Grenier	White Leghorns	126	685
*Beckley Poultry Farm	Do.	128	650
*Rock View Poultry Farm	Do.	119	642
*Mrs. L. Andersen	Do.	131	640
F. Sparsholt	Do.	121	637
*O. Goos	Do.	120	635
*J. W. Newton	Do.	126	628
*H. P. Clarke	Do.	144	626
*J. M. Manson	Do.	129	622
*R. C. J. Turner	Do.	133	618
*J. W. Short	Do.	116	604
*G. Williams	Do.	132	603
*Bathurst Poultry Farm	Do.	125	597
Jas. Hutton	Do.	100	597
*Arch. Neil	Do.	133	592
*C. A. Goos	Do.	133	577
G. Marks	Do.	115	574
*Mrs. R. E. Hodge	Do.	126	569
*A. C. G. Wenck	Do.	121	563
G. E. Rogers	Do.	106	555
*H. Fraser	Do.	120	551
Jas. Harrington	Do.	103	539
W. A. and J. Pitkeathly	Do.	104	529
W. Becker	Do.	114	529
*J. Purnell	Do.	127	516
C. Quesnell	Do.	102	507
W. and G. W. Hindes	Brown Leghorns	102	502
Jas. Earl	White Leghorns	104	496
Chapman and Hill	Do.	102	495
E. Ainscough	Do.	116	487
*Mrs. E. White	Do.	109	484
*N. J. Nairn	Do.	117	465
Parisian Poultry Farm	Do.	101	454
	HEAVY BREEDS.		
*W. Becker	Chinese Langshans	143	735
*R. Burns	Black Orpingtons	146	727
*Jas. Potter	Do.	151	704
*Jas. Ferguson	Chinese Langshans	148	703
*Mrs. A. E. Gallagher	Black Orpingtons	138	679
*Jas Hutton	Do.	137	678
J. R. Douglas	Do.	113	641
*E. Walters	Do.	127	631
*Mrs. A. Kent	Do.	124	627

EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE—*continued.*

Competitors.	Breed.	Sept.	Total.
LIGHT BREEDS—*continued.*			
*Parisian Poultry Farm	Black Orpingtons	139	622
*E. F. Dennis	Do.	121	617
*T. Hindley	Do.	129	607
W. T. Solman	Do.	124	605
*H. M. Chaille	Do.	118	604
*R. Holmes	Do.	127	594
R. Conochie	Do.	107	591
Beckley Poultry Yards	Do.	120	557
*C. C. Dennis	Do.	130	553
*J. H. Jones	White Wyandottes	131	552
G. E. Rogers	Black Orpingtons	123	550
Rev. A. McAllister	Do.	115	532
W. F. Ruhl	Do.	123	524
H. B. Stephens	Do.	124	517
Jas. Ferguson	Plymouth Rocks	101	508
W. G. Badcock	Chinese Langshans	102	478
V. J. Rye	Black Orpingtons	110	465
F. J. Murphy	Do.	125	402
Jas. Ferguson	Rhode Island Reds	101	364
Mos. Stephens	Black Orpingtons	101	342
Totals		8,269	39,197

* Indicates that the pen is being single tested.

DETAILS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
C. H. Singer	120	164	131	113	125	139	792
W. and G. W. Hindes	116	136	121	114	142	141	770
N. A. Singer	114	135	141	135	121	119	765
Oakleigh Poultry Farm	132	123	109	109	124	103	700
Ancona Club	107	120	141	95	109	121	693
S. L. Grenier	104	116	126	113	117	109	685
Beckley Poultry Farm	114	95	89	112	121	119	650
Rockview Poultry Farm	116	125	110	108	92	91	642
Mrs. L. Andersen	82	116	120	120	99	103	640
O. Goos	99	111	116	105	94	110	635
J. W. Newton	113	111	100	83	106	115	628
H. P. Clarke	116	76	117	98	111	108	626
J. M. Manson	102	93	124	121	99	83	622
R. C. J. Turner	99	105	103	103	91	117	618
J. W. Short	100	96	105	111	108	84	604
Geo. Williams	113	115	86	93	103	93	603
Bathurst Poultry Farm	102	105	89	111	102	88	597
Arch Neil	88	97	80	113	118	96	592
C. A. Goos	99	115	83	100	85	95	577
Mrs. R. E. Hodge	89	96	86	107	101	90	569
A. C. G. Wenck	97	82	92	100	85	107	563
H. Fraser	99	82	88	86	98	98	551
J. Purnell	90	79	93	74	102	78	516
Mrs. E. White	70	78	98	89	79	70	484
N. J. Nairn	90	62	88	79	73	73	465

DETAILS OF SINGLE HEN PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
HEAVY BREEDS.							
W. Becker	127	132	129	120	122	105	735
R. Burns	131	105	117	111	166	97	727
Jas. Potter	101	130	113	117	107	136	704
Jas. Ferguson	124	130	110	114	114	111	703
Mrs. A. E. Gallagher	109	121	113	115	109	112	679
Jas. Hutton	121	118	123	108	109	99	678
E. Walters	128	130	93	95	89	96	631
Mrs. A. Kent	96	135	92	132	91	81	627
Parisian Poultry Farm	72	100	107	119	116	108	622
E. F. Dennis	118	109	97	100	99	94	617
T. Hindley	105	116	116	110	84	76	607
H. M. Chaille	100	116	109	107	83	89	604
R. Holmes	84	86	102	96	108	118	594
C. C. Dennis	96	104	66	100	89	98	553
J. H. Jones	94	98	103	93	64	100	552

WEIGHT OF EGGS, SINGLE HEN PENS.

—	A.	B.	C.	D.	E.	F.	Average
	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.
LIGHT BREEDS.							
S. L. Grenier	$2\frac{1}{8}$	2	2	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$
H. P. Clarke	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	2	2	$2\frac{1}{8}$
G. Williams	2	2	2	$2\frac{1}{4}$	2	$2\frac{1}{8}$	2
W. and G. W. Hindes	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{1}{8}$	$2\frac{1}{8}$	2	$2\frac{1}{8}$
C. H. Singer	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{1}{4}$	2	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{1}{8}$
N. A. Singer	$2\frac{1}{4}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$
H. Fraser	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{1}{8}$	2	$2\frac{1}{8}$	2	$2\frac{1}{8}$
Arch. Neil	$2\frac{1}{8}$	2	2	2	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$
J. M. Manson	$2\frac{1}{8}$	$2\frac{1}{8}$	2	2	$2\frac{1}{4}$	$2\frac{1}{8}$	$2\frac{1}{8}$
Mrs. R. E. Hodge	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$
N. J. Nairn	$2\frac{1}{4}$	$2\frac{3}{8}$	$2\frac{1}{8}$	$2\frac{1}{4}$	2	$2\frac{1}{8}$	$2\frac{1}{8}$
J. W. Short	$2\frac{1}{8}$	2	2	$2\frac{1}{8}$	$2\frac{1}{8}$	2	2
Bathurst Poultry Farm	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	2	2	$2\frac{1}{4}$	$2\frac{1}{8}$
A. C. G. Wenck	$2\frac{1}{8}$	2	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{4}$	2	$2\frac{1}{8}$
C. A. Goos	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{1}{8}$
J. Purnell	2	2	$2\frac{1}{4}$	2	2	$2\frac{1}{4}$	$2\frac{1}{8}$
Mrs. L. Andersen	$2\frac{1}{8}$	$2\frac{1}{4}$	2	$2\frac{1}{8}$	$2\frac{1}{8}$	2	$2\frac{1}{8}$
O. Goos	2	2	2	2	2	2	2
Rock View Poultry Farm	2	$1\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$
E. White	2	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{1}{8}$	2	$2\frac{1}{8}$	$2\frac{1}{8}$
Ancona Club	$2\frac{3}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{1}{4}$
R. C. J. Turner	2	$2\frac{1}{8}$	$2\frac{1}{8}$	2	$2\frac{1}{4}$	$2\frac{1}{8}$	$2\frac{1}{8}$
Beckley Poultry Farm	2	2	2	$1\frac{7}{8}$	2	2	2
J. W. Newton	2	2	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	2	2
Oakleigh Poultry Farm	2	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$
HEAVY BREEDS.							
J. H. Jones	$2\frac{1}{8}$	2	$2\frac{1}{8}$	2	$2\frac{1}{4}$	2	$2\frac{1}{8}$
E. Walters	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	2	$2\frac{1}{8}$	$2\frac{1}{8}$
Jas. Potter	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{4}$	2	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{1}{8}$
Parisian Poultry Farm	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	2	2	$2\frac{3}{8}$	$2\frac{1}{8}$
Jas. Ferguson	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{1}{8}$
R. Holmes	$2\frac{1}{8}$	$2\frac{1}{8}$	2	$2\frac{1}{8}$	2	2	2

WEIGHT OF EGGS, SINGLE HEN PENS—*continued.*

—	A.	B.	C.	D.	E.	F.	Average.
	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.
HEAVY BREEDS—*continued.*							
Jas. Hutton	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{3}{8}$	$2\frac{1}{8}$	$2\frac{3}{8}$	$2\frac{1}{4}$
R. Burns	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{1}{4}$
Mrs. A. E. Gallagher	2	2	2	2	2	$2\frac{1}{8}$	2
E. F. Dennis	2	2	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$	2	$2\frac{1}{8}$
T. Hindley	$2\frac{1}{8}$	$2\frac{1}{8}$	2	$2\frac{1}{8}$	$2\frac{1}{8}$	2	$2\frac{1}{8}$
C. C. Dennis	$1\frac{7}{8}$	$1\frac{7}{8}$	2	$1\frac{7}{8}$	$1\frac{7}{8}$	$1\frac{7}{8}$	$1\frac{7}{8}$
Mrs. A. Kent	2	2	$2\frac{1}{8}$	2	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{1}{8}$
A. Chaille	$2\frac{1}{4}$	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{3}{8}$	$2\frac{1}{4}$	$2\frac{1}{4}$
W. Becker	$2\frac{1}{8}$	$2\frac{1}{8}$	2	2	$2\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{1}{8}$

GROUP PENS.

—	Average. Weight.	—	Average Weight.
LIGHT BREEDS.			
	Oz.		Oz.
Jas. Earl	$2\frac{1}{8}$	G. E. Rogers	$2\frac{1}{8}$
G. Marks	2	G. Ainscough	$2\frac{1}{8}$
Jas. Harrington	$2\frac{1}{8}$	F. Sparshott	2
Parisian Poultry Farm ..	2	Hill and Chapman	$2\frac{1}{8}$
W. A. and J. Pitkeathly ..	2	Jas. Hutton	2
C. Quesnell	2	W. Becker	2
W. and G. W. Hindes ..	2		
HEAVY BREEDS.			
R. Conochie	$1\frac{3}{4}$	Beckley Poultry Farm ..	$2\frac{1}{8}$
J. Ferguson (R.I.R)	$2\frac{1}{8}$	V. J. Rye	$1\frac{7}{8}$
W. G. Badcock	$2\frac{1}{8}$	J. Ferguson (P.R.)	2
Mos. Stephens	$2\frac{1}{8}$	W. T. Solman	2
G. E. Rogers	2	Rev. A. McAllister	$2\frac{1}{8}$
F. J. Murphy	$1\frac{7}{8}$	W. F. Ruhl	2
H. B. Stephens	$2\frac{1}{8}$	J. R. Douglas	$1\frac{7}{8}$

P. M. PITT,
Acting Principal.

N.U.P.B.A. COMPETITION, ZILLMERE.

During the month of September 3,029 eggs were laid, an average of 23 eggs per bird. One death occurred, a White Leghorn, the property of Mr. Duff (No. 65), due to rupture.

Nos. 100, 115, and 116 were reported broody during the month.

WHITE LEGHORNS.

Pen.	Owner.	Sept.	Total.	Pen.	Owner.	Sept.	Total.
62	Miss L. M. Dingle ..	28	u159	65	R. Duff	22	131
14	Enroh Pens ..	27	u147	27	H. T. Britten ..	23	u130
75	W. Shaffrey ..	24	u145	64	S. Lloyd	26	130
15	W. J. Berry ..	24	u138	33	A. S. Walters ..	25	128
8	Oakleigh P. Farm ..	23	137	13	Enroh Pens ..	25	127
72	W. H. Forsyth ..	27	136	16	W. J. Berry ..	24	u126
50	J. Harrington ..	24	132	22	M. F. Newberry ..	24	126
54	H. Holmes	27	u132	61	Miss L. M. Dingle ..	23	126
66	R. Duff	24	132	4	T. H. Craig ..	27	125

N.U.P.B.A. COMPETITION, ZILLMERE—*continued.*

WHITE LEGHORNS—*continued.*

Pen.	Owner.	Sept.	Total.	Pen.	Owner.	Sept.	Total.
30	W. and G. W. Hindes	24	125	36	J. T. Webster ..	23	104
41	W. Wakefield ..	24	125	40	J. Earl	23	103
51	Kidd Bros.	24	125	78	W. Smith	25	103
18	A. W. Ward ..	24	124	11	A. Neil	23	102
81	J. E. G. Purnell ..	19	124	12	A. Neil	23	u102
28	H. T. Britten ..	25	123	23	Parisian P. Yards	25	100
49	J. Harrington ..	24	123	34	A. S. Walters ..	24	u98
59	G. Scaletti	26	122	56	G. Baxter	19	98
20	W. Witt	26	121	77	W. Smith	22	98
70	R. Shaw	25	121	83	L. Andersen ..	24	97
76	W. Shaffrey ..	21	120	35	J. T. Webster ..	22	96
3	T. H. Craig ..	24	119	25	E. Stephenson ..	21	u94
38	G. Williams ..	24	119	44	Kelvin P. Farm ..	25	94
43	Kelvin P. Farm ..	23	119	21	M. F. Newberry ..	28	91
84	L. Andersen ..	25	119	17	A. W. Ward ..	23	90
42	W. Wakefield ..	24	116	6	P. J. Fallon ..	22	89
69	R. Shaw	24	116	63	S. Lloyd	17	u88
29	W. and G. W. Hindes	24	u114	58	H. Fraser	24	u87
55	G. Baxter	21	114	46	F. R. Koch ..	22	85
73	A. Hodge	26	113	85	A. Cowley	21	85
1	Carinya P. Farm ..	23	112	24	Parisian P. Yards ..	23	84
7	Oakleigh P. Farm ..	24	112	32	H. Needs	23	84
71	W. H. Forsyth ..	23	112	5	P. G. Fallon ..	23	84
19	W. Witt	15	111	39	J. Earl	22	82
26	E. Stephenson ..	22	111	47	R. D. Chapman ..	26	80
45	F. R. Koch	23	111	67	J. and G. Green ..	20	79
48	R. D. Chapman ..	24	111	52	Kidd Bros.	27	74
53	H. Holmes	26	u110	79	W. Bliss	24	64
2	Carinya P. Farm ..	24	109	82	J. E. G. Purnell ..	23	61
10	R. C. J. Turner ..	23	u109	68	J. and G. Green ..	20	59
31	H. Needs	20	109	60	G. Scaletti	18	49
37	G. Williams ..	25	108	9	R. C. J. Turner ..	20	u47
57	H. Fraser	22	108	80	W. Bliss	9	35
74	A. Hodge	26	107	86	A. Cowley	5	28

BLACK ORPINGTONS.

Pen.	Owner.	Sept.	Total.	Pen.	Owner.	Sept.	Total.
95	J. Potter	27	165	105	W. Smith	23	111
92	J. Pryde	26	u151	93	H. B. Stevens ..	28	u110
109	T. Brotherton ..	28	143	87	Parisian P. Yards ..	25	109
113	E. Walters	26	138	118	E. C. Raymond ..	23	107
96	J. Potter	28	135	107	E. F. Dennis.. ..	12	106
112	H. M. Chaille ..	16	135	116	C. C. Dennis ..	16	105
115	C. C. Dennis ..	17	u135	114	E. Walters	26	u104
120	J. Harrington ..	24	134	106	W. Smith	23	100
89	K. Macfarlane ..	25	133	91	J. Pryde	22	u97
101	Enroh Pens	29	130	108	E. F. Dennis ..	18	97
119	J. Harrington ..	19	126	90	K. Macfarlane ..	27	92
104	L. Pritchard ..	20	125	94	H. B. Stephens ..	22	92
110	T. Brotherton ..	27	125	99	S. Donovan ..	21	86
111	H. M. Chaille ..	27	120	103	L. Pritchard ..	22	83
102	Enroh Pens	17	119	98	W. Shaffrey ..	26	82
117	E. C. Raymond ..	24	119	97	W. Shaffrey ..	24	62
88	Parisian P. Yards ..	29	111	100	S. Donovan	9	58

OTHER BREEDS.

Pen.	Owner.	Sept.	Total.	Pen.	Owner.	Sept.	Total.
131	W. H. Forsyth (S.W.)	25	143	127	A. S. Walters (B.R.)	21	73
128	A. S. Walters (B.R.)	25	133	124	J. Ferguson (Anc.)	22	69
125	J. Ferguson (Lang.)	28	122	121	Parisian P.Y. (B.L.)	18	u61
126	J. Ferguson (Lang.)	21	122	130	R. A. Girling (Min.)	21	55
122	Parisian P.Y. (B.L.)	21	91	129	R. A. Girling (Min.)	22	44
123	J. Ferguson (Anc.)	22	81	132	W. H. Forsyth (S.W.)	24	u43

"u" indicates eggs under 2 oz.

SUGAR: FIELD REPORTS.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) received the following report, 18th October, 1923, from Mr. E. H. Osborn, Northern Field Assistant:—

Lower Burdekin.

Rainfall records for current year:—

——	Ayr.	Home Hill.	Giru.	Rollingstone.
	In.	In.	In.	In.
January	·32	1·93	2·67	7·42
February	.12	·05	·39	4·91
March	.63	·10	3·34	4·35
April	·55	1·09	·04	1·04
May	Nil	Nil	Nil	2·73
June	3·93	4·12	3·93	6·20
July	·06	·61	·02	·15
August	1·02	·65	1·02	1·78
September	1·38	1·02	Nil	Nil
	8·01	9·57	11·41	28·58

Despite exceptionally dry conditions as indicated in the foregoing table, some really splendid cane was seen throughout the Burdekin; in fact, to see some of this cane in the various mill yards made it difficult to believe that farmers were having such a bad time.

Throughout the Burdekin a large amount of planting has taken place (more especially around Inkerman); but although some very fine early planted cane was seen, a proportion of the later planted cane was affected by cold weather and had only made medium strike. Among extra good blocks noticed was a 32-acre field of H.Q.426 and N.G.24 and N.G. 24B., owned by Mr. R. Oakes. This has had about six ploughings.

Messrs. Cameron and Irving have also a good strike of Badila, planted in July, while some fine B.208 (June) of about 8 acres in area was seen upon Mr. W. Payward's farm. Another fine strike was upon Mr. H. Todd's, comprising Badila, Goru, and B.208, and planted in June. Both Messrs. Payward and Todd ploughed in a crop of cowpea prior to planting, and the ground was and now is in beautiful tilth. Upon the Inkerman side one of the best paddocks seen was planted with Mr. Radcliffe's early crop of H.Q.426. As previously mentioned, there seems to be a larger proportion of young cane upon this side, and, generally speaking, the strike seems to be better. This is probably to be accounted for by the fact that the irrigation scheme is now in full operation, and is being largely availed of by all the growers.

Cane varieties principally planted upon the Burdekin are B.208, H.Q.426 (Clarke's Seedling), the Gorus, Badila, Hybrid No. 1, Q.903, Q.813, Striped Singapore, &c. Many inquiries were made for E.K.28, and the State Farm distributed all that was available.

Some remarkably good cane has been harvested this season. Mr. J. Dwyer states that he cut 280 tons of B.208 (twelve to thirteen months old) for an average density of 18 c.c.s., whilst the H.Q.426, on an adjoining block, cut from 16.40 to 17.80 c.c.s. Messrs. Norris and Thompson, of Maidavale, also cut 7 acres of B.208 plant, yielding 45 tons per acre for a density of 15 to 17 c.c.s., while they expect their whole crop to average 40 tons per acre for the 40 acres harvested. All these areas were kept well watered.

Some very good first ratoons were delivered at Inkerman from Messrs. V. Hansen, S. W. Gibson, and Ferguson. At Kalamia some excellent first ratoons, Goru 24 and 24A, are cutting at the rate of 35 tons per acre from a 6-acre paddock belonging to Messrs. Cameron and Irving. So far its density has averaged 15 c.c.s. No manure was used, but the land is fairly new. The ratoons would be a credit to any cane district in North Queensland.

Manures.—The use of fertilisers is becoming more popular every year upon the Burdekin. Several experienced growers have expressed their intention of using cowpea as a green crop. Where green manuring has been practised the soil shows great improvement, both in its texture and its power of retaining moisture.

Diseases and Pests.—The Burdekin so far has been fairly free from both. Of the former, B.208 and M.1900 were noticed to be suffering from a form of leaf affection, consisting of white spots and blotches withering away at edges and tips of leaves in many places. This is most marked in the former cane, as its side shoots also show the discolouration in places. Evidently dryness makes this more marked this season than in former years. Growers are again strongly advised against planting any but the very best seed.

Grubs as mentioned in my last report, although prevalent to a large extent in one or two farms, have not done as much damage as anticipated.

Pioneer and Inkerman were anticipating an early finish of the crushing. Each mill was enjoying a splendid run, and the quality of the cane was very high.

Haughton Valley (Giru).

This mill was also in full operation, and a good supply of cane of fair density was going through. Like the Burdekin mills, its expected tonnage was much below its earlier estimates owing to weather conditions. The tramway had been completed, and an engine was kept busy pulling cane over its 6 miles of line. Derricks have been erected at central spots, and by its use harvesting has been made much easier.

Despite dry weather and lack of irrigation, some very good young plant cane was noticed on Messrs. Humphrey's, Walton's, McCloskey's, A. and J. Brooks's farms, and the Brandon Estate's 40-acre block. On the lastnamed farm an 8-in. pumping plant has been installed.

Rollingstone Bambaroo.

Mr. S. Macree has the largest and most forward crop of cane in ine Rollingstone area. He is also now installing an irrigation plant with two pumps.

At Mungabulla and Mutarnee some good cane has been harvested by Messrs. V. Tilvey and Barney.

CLIMATIC CYCLES.

By H. I. JENSEN, D.Sc. (Syd.)

In October last year (1922) the "Queensland Government Mining Journal" paid me the compliment of outlining the solar cycle theory of volcanic and earthquake phenomena and climate which I enunciated in 1902, and published in the "Proceedings of the Royal Society of New South Wales" in 1902 and 1904. The Journal said: "It will be interesting in the circumstances to see if the coming year, 1923, which will be a year of sunspot minimum, will be accompanied, as far as Australia is concerned, with drought conditions and by volcanic eruptions and earthquakes in other parts of the world."

We have seen that 1923 has been exactly what the solar cycle theory prognosticated. In an article in this Journal, May, 1923, I dealt with this same subject mainly in regard to meteorology. As the subject is one of considerable importance, one is justified in enlarging on it, particularly with a view of getting the general public and the Federal Government to realise the necessity of establishing an up-to-date solar observatory in Australia, so that periods of drought and periods of exceptionally wet weather may be forecasted, thus saving the farmers much expense incurred in planting crops doomed to destruction.

If such periods were forecasted wheat could be grown in the coastal regions during the dry cycles, and in the inland regions in wet cycles with immense advantage to the State.

Worldwide periods of drought are of common occurence as shown in my article in May, and occur at sunspot minimum. Thus the years 1811-12, 1834-36, 1855-56, 1866-69, 1876-78, 1888-89, 1899-1902, 1911-12, 1922-23 were years of drought, not only in Australia but in every continent.

Eclipses of the sun are usually accompanied by the most magnificent coronæ in years of sunspot minimum. Such were seen in 1868, 1878, 1889, 1900, 1901, 1912, 1922.

The Rothesay rainfall record, extending over a period of more than 100 years, shows exceptionally dry times to have been experienced in Britain during 1822, 1855, 1887, 1901, and 1922, all years of sunspot minimum.

In Australia we have had severe droughts in 1811-12, 1833-36, 1855-56, 1866-68, 1876-78, 1888-89, 1899-1902, and 1922-23, all periods of sunspot minimum.

On the other hand, the periods of sunspot maxima like 1863-64, 1870-72, 1890-96, 1904-1909, 1914-1919 have been years of average good seasons, though a localised drought was experienced in parts of Queensland in 1916, making a short break in an otherwise good cycle as far as this State is concerned.

Floods like the 1890 and 1893 are often very severe during sunspot maximum periods, especially just after a dry cycle, as there is not much vegetation to delay the run off of flood waters.

The sunspot cycle is not quite regular. A great maximum is followed by two smaller maxima, and a "great minimum" by two smaller minima, before the next great maximum or minimum comes on. We therefore get a 33 to 35 year interval between two periods of exactly similar weather conditions. The very complete researches of Dr. Hann, the Austrian meteorologist, showed that climate as a whole underwent a long period variation of 33-37 years corresponding with three sunspot periods. Other meteorologists like Meldrum, Blanford, Begelow, &c., have shown that this 35-year cycle applies to cyclones in the West Indies, weather conditions in India and other parts of the world.

Since the factors which contribute to this long period variation in solar conditions are astronomical, depending on the attractions of the planets Jupiter, Saturn, and other planets, it follows that to issue true seasonal forecasts the relations between sunspot conditions and planetary attractions must be more closely studied. That is why an Australian solar observatory is so badly needed.

An expense of a few thousand pounds annually in this direction would probably save Australia a quarter of a million sterling per annum.

Without the knowledge that such an observatory would yield it is impossible to anticipate the periods correctly, as the interval between the sunspot maxima may vary from 9 to 12 years, and the Bruckner cycle (the long period variation) from 33 to 37 years.

It is, however, safe to say that the drought we are at present experiencing is a repetition of the one of 1888-89. It commenced in 1922, thirty-four years after the one it is a true parallel of. It will probably finish this year, and in 1924 we will probably get floods like those of 1890, and in 1927 a real severe flood period similar to 1893. Farmers will do well to anticipiate a wet year in 1924, especially during the latter half.

The sunspot minimum of 1900-1902 was a great minimum. It will, on the Bruckner cycle, be repeated between 1933 and 1937, with drought in Australia and seismic disturbances in other parts of the world. With a well equipped solar observatory in Australia it should be possible to forecast the commencement and duration of this drought within a limit of accuracy of six months, sufficiently accurate to be of much value to agriculturists.

If ratooning cotton should be permitted by the Government, it would be advisable to ratoon crops during that drought, which will be similar to the one of 1900-1902. As we will probably have ten good years before that drought sets in, there may be many changes in legislation in the interval, and during the good years annual planting may prove most profitable.

QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

No. 25.

PEPPERBERRY TREE.

The Pepperberry Tree, *Cryptocarya obovata,* is a very tall species of the coastal rain-forest or "scrub" country of Northern New South Wales and Queensland. The base of the barrel is frequently flanged or almost buttressed. The bark is grey in colour, and not conspicuously marked by scabs or excrescences. In the field the tree has the appearance of the Bumpy Ash, *Flindersia Schottiana,* but has not the prominent protuberances which appear at intervals along the barrel of the latter species. The timber is pale in colour, and should be useful for indoor fittings and cabinet work. The species is found as far south as the Port Stephens district, in New South Wales (J. H. Maiden), and as far north as Rockingham Bay, Queensland (Bentham).

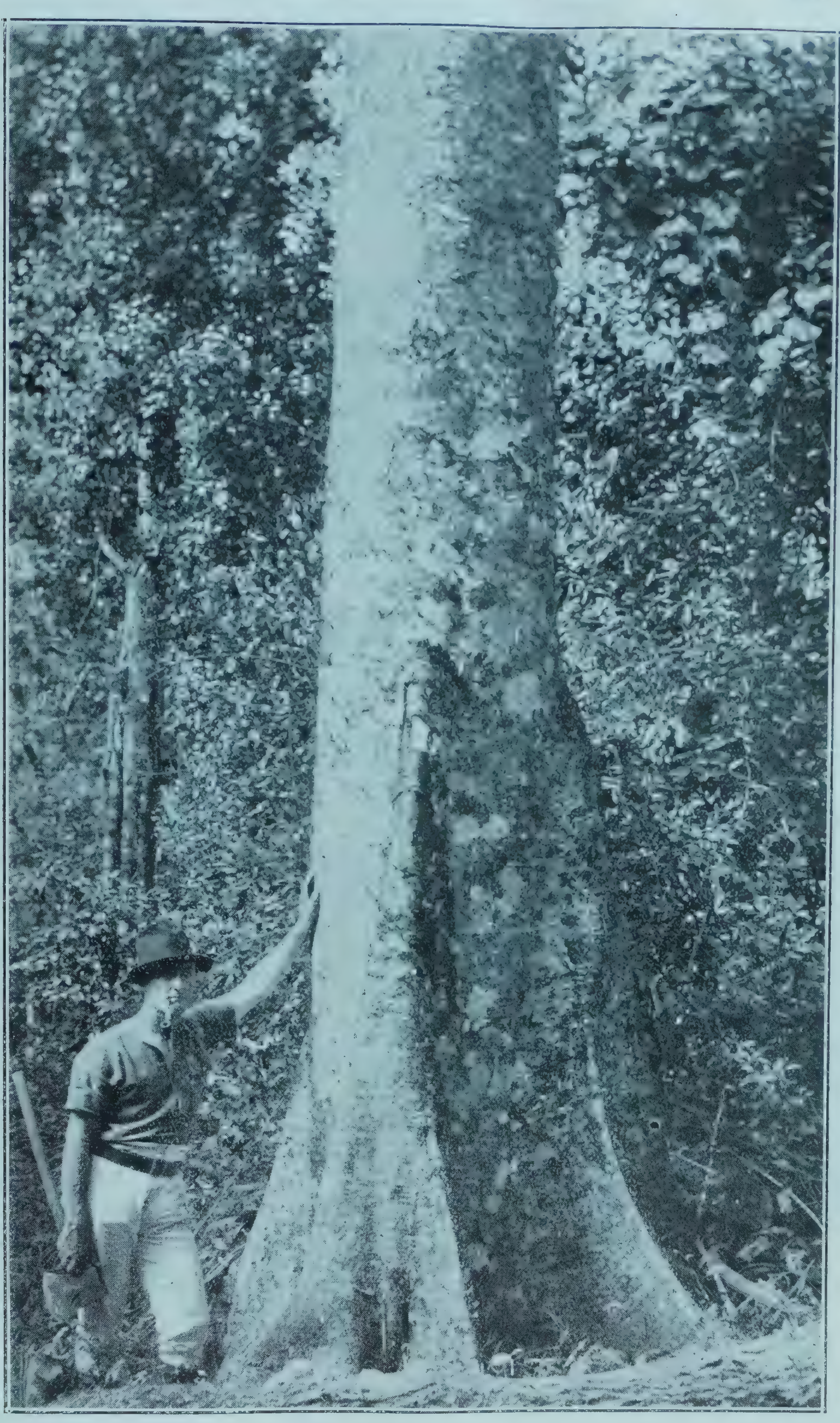

Photo. by the Authors.]

PLATE 95.—PEPPERBERRY TREE (*Cryptocarya obovata*).
A Specimen in the Rain Forest east of Emu Vale.

Photo. by Dept. of Agriculture and Stock.]

TOMATO CATERPILLAR OR "WORM"

(Chloridea obsoleta,* Say.—*Noctuidae).

By HENRY TRYON, Government Entomologist and Vegetable Pathologist.

INTRODUCTORY.

Moth caterpillars of one kind or another have been unusually prevalent since the winter months in Southern Queensland, with corresponding injury to plant life. In some instances the moths, their progenitors, have occurred in swarms, extending over large areas.

Amongst the cultivated plants that have suffered is the tomato, ordinarily one of the most profitable ones that are being grown; and the depredator in its case that has committed (and is inflicting still) the most serious injury is the so-called Tomato Fruit Worm—the caterpillar of a noctuid moth—named *Chloridea obsoleta*, that in some instances has rendered useless the entire yield. This insect is of no new occurrence here, being described as a pest insect by the present writer in 1889, when already it was well known. Nor is it exclusively an Australian denizen, for it occurs apparently nearly all the world over, including many of the oceanic islands throughout both the temperate and tropical zones. Moreover, its injurious relations are manifested by a very large number of food-plants, including staple crops, such as maize, cotton, and tobacco. Its dietary here is, too, as general as it is elsewhere. This and its mode of living constitute it an injurious insect of special prime importance, and volumes of literature have been produced relating to it and its control, although notwithstanding—after years of research—the methods devised fall short of meeting the requirements of the situation. One of the most recent compilations was "Injurious Insects of Cotton—The Cotton Worm," issued in February, 1923, by this Office. This very general dietary amongst plants, its very rapid increase, and its habits, especially with regard to feeding, render its subjugation or control exceedingly difficult.

THE INSECT AND ITS HABITS.

Without repeating what is set forth in the pamphlet mentioned, it may be stated that the parent of the caterpillar is a stout-bodied moth measuring about ⅜ inch in length, with a wing-spread of about 1½ inches. When settled, the front wings—usually drab coloured with indistinct brown markings—almost conceal the hind ones, that are whitish with broadly black tips; the former making rather a wide angle with the body and sloping away on each side. These moths are nocturnal in their habits, generally speaking, and occur concealed settled in herbage, or under earth clods during the day, but moving off with dart-like rapidity when disturbed.

The moth feeds on the nectar or honey of different flowers, usually after sundown, but occasionally during daylight, when it may be seen with quivering wings on the blossom it affects.

Each female moth, according to estimates made, may lay from 400 to 3,000 eggs, the average being about 1,000. Moreover, it may commence laying—having meanwhile mated—on the second day of its emergence from the chrysalis, and continue laying for ten to twelve days after this. These eggs are at first whitish in colour and measure about one-fiftieth of an inch across (about half the size of the head of a small pin) and are low dome-shaped, almost spherical, with a series of fine ribs radiating downwards from their tops. They darken as they mature or when parasitised. In the case of the tomato, they are usually placed (always singly) on the green calyx-segments of the flower bud or flower or on the tender tomato growth; but when the insect is numerous, elsewhere.

Our assistants, T. H. Simmonds, B.Sc., and J. Weddell, referring to a marked incident of this nature, recently informed us as follows:—

"Eggs were found on stems, foliage, calyx, petals, stamens. In one case, five eggs were seen clustered on the petals of one flower. The following counts of eggs from one branch, consisting of about six leaves and two flower sprays, were made:—Leaf, 5 eggs on under surface, 6 eggs on upper; flower, 10 eggs on petals and 3 eggs on calyx." Sometimes all the eggs laid will give rise to caterpillars, but as A. A. Girault, Assistant Entomologist, discovered in the course of investigations in the United States in 1905, commonly many do not do so.

The eggs, when deposited, are capable of hatching in as short a period as three days, but usually rather more than four elapse before the tiny pale dark-headed caterpillars emerge. These caterpillars may exceptionally come to maturity amidst the foliage of the tomato plant, but usually speedily repair to the green fruit,

tunnelling their way into it near the calyx end, even when this is partly grown. More frequently, however, as the outcome of the situation in which they are deposited, the minute ovary as it is formed receives their earliest attention. On this subject, Messrs. Simmonds and Weddell again have observed as follows:—

"In several cases the petals had been eaten and young fruit beneath just commencing to 'set' also eaten. Once, on removing the petals and stamens, a very young larva was found inside on the developing fruit."

From the first scene of the insect's depredations, especially in cases such as these, the growing caterpillar passes from one fruit to another, injuring all in turn. Thus a single caterpillar may do considerable damage, since every fruit entered is "done for," so to speak.

The caterpillars each have a larval period of about two weeks on an average, but this may be extended to three. During this time they vary greatly in appearance with each of the six changes of their skins, being unstriped during the first two instars. (Further description is unnecessary in writing for tomato growers.) When full grown it is about $1\frac{3}{8}$ inch long.

When this happens, the caterpillar drops to the ground and digs its way into it, after moving off, if at all, usually but a few inches only. Thus it enters to a depth in it of from $3\frac{1}{2}$ inches to 6 or 7 inches—usually, say, 4 inches. In this position—after first making a special exit tube that nearly reaches the surface again—it forms a little oval cell in which it transforms to a smooth, glossy-brown chrysalis having two straight thorn-like bodies at the tail end. (*Note.*—Should the soil be covered with rubbish, the chrysalis chamber may be nearer the surface.)

This chrysalis or pupal condition varies in duration according to the temperature to which, when in the soil, it is subject. It may be as short as ten and a-half days, but be many days longer if cold be experienced. In a temperate climate where frosts constantly occur during the winter, the insects may live in this condition for eight to nine months. When, however, the full period has been reached, the insect comes forth from its chrysalis.

NATURAL INCREASE AND CONTROL.

The foregoing remarks will suggest that between one egg-laying and another, on the part of the succeeding moth generations, from twenty-eight to thirty-two days may elapse only, and with a congenial climate like that of Southern Queensland it may be readily understood that there may be many generations of moths, and so many distinct broods of caterpillars during such a long season as is devoted to tomato-growing is the latitude of Brisbane. These broods, however, are not distinctly defined, as all the moths of one age do not emerge on a single day and oviposition in the case of any one individual extends also over several (*vide* "Successive Generations," "Injurious Insects of Cotton," p. 6).

The theoretical potential increase, however, is perhaps never realised, as natural conditions supervene to obviate this. These are weather conditions, food conditions, and natural enemies—birds, insects, and diseases. On the other hand, as has recently happened, these natural agencies for controlling numerical development and crop injury have evidently been restrained in their activity, and hence the loss of crop.

There is, however, in the presence of parasites of the Tomato Caterpillar that have come upon the scene, some prospect of natural enemies operating to restore normal conditions, notwithstanding the immense toll on insectivorous bird life arising from extensive bush fires operating during the breeding seasons, when all birds are animal (insect) feeders—fires often wantonly started. These parasites that have been observed by the staff are a minute egg-parasite (Trichogramma), a caterpillar fly parasite Tachinus, and an Ichneumon parasite; but as yet the extent to which they are operative has not been ascertained. Again, disease that is present with the occurrence of wet weather might prove especially virulent towards the insect.

MEASURES OF CONTROL.

Field Practice.

Avoid growing in the vicinity of crops of tomatoes plants that in common with it afford sustenance for the insect, unless they, too, receive continuous attention directed towards its repression. This especially applies to maize, cotton, cape gooseberry (*Physalis*), rosella, and tobacco, but also to plants that receive less attention by the Chloridea than they; thus peas must not be overlooked, and so also certain ornamental plants such as snapdragon or Antirrhinum.

Wormy tomatoes (beings already rendered useless) should be gathered and destroyed; burying to a depth of 1 foot will in most cases meet the latter requirement. This will prevent sound fruit being visited by caterpillars from injured fruit; but it will also destroy those "worms" that, otherwise, would leave it, to enter the soil to give rise in a few days to moths whose progeny would intensify the trouble. Tomato plants when eradicated should also be burnt, as soon as practicable, rather than left in heaps on the headlands.

Prior to planting, and especially when contrary to what is above suggested, devoting the same area to immediate successive tomato growth, and in which case as long an interval as may be found convenient should be observed, the soil should be well cultivated and turned over more than once. Thus will be exposed to the fatal action of birds and the weather those insects dwelling in it, either as chrysalises or caterpillars about to change within their earthen cells. So also when the tomatoes are being grown the soil should be cultivated wherever it is admissible to do so. Should again a "green crop" such as cowpea or Mauritius bean, that may harbour also the insect be ploughed under prior to planting, this should be well covered under and pressed down by rolling, so that any caterpillars present be destroyed.

As far as economic considerations will admit of it, crops that are not attacked by this insect should be grown in alternation with those that are—*e.g.*, cucumbers or rock melons as a substitute for tomatoes.

Trap Crops.

Observation indicates that although the insect reared as a moth from one kind of plant has often acquired a liking for it again, generally speaking, there are those that it especially favours. This especially applies to maize as compared with tomato, particularly to the cooking variety known as sweet corn. Maize is therefore commonly grown in other countries as a trap crop in protecting cotton from its injurious presence. It is especially serviceable in dealing with the first brood of insects. Its value as a trap entirely depends, however, on its being taken out and used as or converted into fodder, as soon as or shortly after the silking stage has been reached. Otherwise it will serve, whilst attracting the moths from all round it, to furnish in due course others to attack the plant it is intended to protect. Obviously it is not implied that maize can be grown as a substitute for the tomato as a crop of equal monetary value, but when no yield of tomatoes is promised owing to caterpillar attack its growth may be profitable. Under special circumstances the use of a special "green manure" plant, Canavallia striata, whose pods are favoured by Chloridea, has been adopted with some success as a trap crop.

Trapping and Repellants.

With regard to methods of destruction directed against the moth itself, the very extended experience of entomologists in other countries, as well as in Australia, does not afford much promise of success. It is not at all or very seldom attracted by light, and therefore special trap lamps, torches, or fires are not available for its capture and destruction. Again, the same remark applies to baits, with or without poison incorporated in them, so useful in coping with the final forms (moths) of other destructive caterpillars. Nor do we know of any substance that will with certainty repel attack on plants threatened. Our Queensland experiences suggest that Bordeaux mixture, when well applied, has some efficacy as a deterrent, but the caterpillar being an internal feeder, except when in the earliest stages of its life, any deterrent has only a transient use.

Contact Insecticides.

This also applies to the use of contact insecticides, on whose efficacy success in coping with other plant injurious insects is so noteworthy. Here, however, we are further confronted with a plant very liable to injury by these potent applications, with too abundant foliage to be affected by them. Our assistants, Messrs. J. H. Simmonds, B.Sc., and J. Weddell, have, however, pointed out that the "worm" is often partly exposed when tunnelling in the fruit and thus not only so when recently emerged from the egg, and so then may also be reached by a direct application, and the writer proposes to test the action of Derrine (that is not plant injurious) under these circumstances.

Food Insecticides.

The use of arsenic-containing insecticide, and the same applies to those containing antimony or cadmium, is not always attended with profitable results. In fact, under field experimental conditions elsewhere, more wormy fruit has been noticed on tomatoes after the application of arsenate of lead (or Paris Green) than on control

plants that have not received any. The better results from the use of these bodies will, however, be reached by closely noticing when the prevalence on the plants of the moth's eggs occur, and then spraying about a week subsequent to this event, a small hand magnifier being useful for the preliminary observation. The application of these insecticides in the form of powder diluted with corn meal, ground sulphur, lime, ashes, &c., is favoured elsewhere, but success in this case is conditioned largely by the state of the atmosphere, since when the air is dry the insecticidal powder is liable to be soon blown away. For the same reason it must be applied very early in the day when dew is still upon the plants or when light rain is being experienced.

Insecticide and Fungicide.

As a routine treatment of tomato, as well as of potato plants, this Office has persistently advised the application of Bordeaux mixture, of 4-40-4 strength (freshly slaked lime 4 lb., bluestone 4 lb., water 40 gallons) made quite neutral, and which is especially adherent if a little soap solution, or preferably molasses, be incorporated with it. This treatment is recommended as a preventive of blight and of less harmful leaf disease, the former of which at times is quite fatal to the tomato. Arsenate of lead may be combined with this fungicide, and 1 lb. to 24 gallons (six kerosene tinfuls) is the amount of it that should be added. As, however, with its use as a fungicide only several applications are necessary. This, however, should have some reference to the general hatching of the eggs of each moth brood, rather than to the lapse of so many days. Spraying also should be commenced very early so as to catch the first brood, as it is very necessary to concentrate on this. In Sumatra the same insect is very harmful to the tobacco, and there the plants are sprayed whilst still in the seed bed.

The Bordeaux mixture slightly reduces the potency of the poison, but then it promotes its adhesiveness to the plant as well as exerts some deterrent action in warding off attack.

NATURAL ENEMIES.

Sedulously preserve native insectivorous birds. Even many of those proclaimed ''pests,'' if permitted to operate over the soil of a tomato field undergoing cultivation would rid it of the insects then occurring thereon.

A study of the parasites of *Chloridea obsoleta*, as recorded in the world's entomological literature, does not leave much hope of any efficacious work in reducing the insect, through the introductions of ones not already occurring here. Borneo is the only country apparently in which this method has been essayed, and its effort has been concerned with an egg-parasite that as it seems already occurs here.

The very slight extent, if at all, to which *Chloridea obsoleta* occurs to an injurious extent in Egypt in relation to the different plants it is associated with there seems to receive its explanation not in the work of parasites but in the cultural treatment that the soil there persistently receives. So also to a less degree with respect to British India.—H.T., 25th October, 1923.

SUGAR AS A FOOD.

Sugar is not detrimental to the teeth, says Sir James Crighton-Browne, the well-known physician, who, in an address before a recent grocers' convention in England, not only made the statement in defence of sugar, but also carried the war into the enemy's country with the further assertion that perhaps sugar more than any other article of food tends to promote the flow of saliva in the mouth, ''than which nothing could be more conducive to the preservation of the teeth in a clean state.'' Sugar is also an aid to digestion, Sir James pointed out, promoting the flow of gastric juice.

The Australians were the finest physically of all the people engaged in the world war, according to Sir James, who voiced his conviction that there is a direct relation between the physical development of a race and the amount of sugar it consumes. The Australians, he showed, consume more sugar per capita than any other people in the world. He also called attention to the Danes, who, also of excellent physique, are heavy sugar eaters, as are likewise the people of the United States and the United Kingdom. Certain nations of Southern Europe, which consume relatively little sugar and who are less notable for physical development, were cited by Sir James in support of his theory.—''South African Sugar Journal.''

FRUIT FLY INVESTIGATION.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has made available the following report of the Entomologist at Stanthorpe (Mr. Hubert Jarvis) for August and September, 1923:—

FRUIT FLY.

No fruit flies have hatched in the Insectary or in the field experiments during the months of August and September. Three fruit flies were reported to have hatched from a last season's quince, which had been kept in a jar indoors at the Summit all the winter; these flies were, however, destroyed and did not come into my possession. On 23rd September, Inspector J. Henderson submitted to me three fruit flies for identification. These flies, he stated, were bred from maggots found in one of some bananas received on 19th June at Stanthorpe from Yandina, N.C. Mr. Henderson, who, on finding the maggots in the fruit, at once placed them in a glass jar with some soil, added that the three fruit flies hatched about 13th September. The weather conditions at that date were exceptionally mild and warm for the time of year. The flies all proved to be examples of *C. tryoni* (the Queensland fruit fly)—two males and one female. This occurring once also in bananas is, moreover, of very great importance, in view of the fact that the banana is not included in the list of fruits requiring cool storage prior to their importation into the Granite Belt.

One other instance of maggots found in imported custard apples during the last few weeks was communicated. These maggots were, however, not forwarded to me, since on being discovered in the fruit they were at once destroyed. The foregoing incidents, however, point to the fact of fruit fly introduction to this district by fruit imported from the markets, and also by fruit sent or brought into the district by private individuals; and too much care cannot possibly be exercised—particularly at the present time of year—to guard against the introduction of the Queensland fruit fly by such means as these.

All persons finding maggots in purchased or donated fruit should at once destroy it by fire, or place it in a secure tin container and then forward it to the Entomologist for identification and other purposes.

OTHER INJURIOUS INSECTS.

Codlin Moth (*Carpocapsa pomonella*).

The larvæ of this apple moth, which were obtained last autumn and during the winter, are now assuming the chrysalis form. Isolated Codlin Moth hatchings have occurred in the field, as is evidenced by several fresh empty pupa-cases which have been met with in the orchards. No moths have, however, yet emerged from the material under observation in the Insectary, but numerous hatchings may be expected within the next few days; one or two varieties of apple are now (2nd October, 1923) in full bloom.

(*Note.*—The time of commencement of spraying should be determined by the appearance of the earliest moths in relation to that of blossoming. When the moth first appears, they will usually on the fourth day from this be laying eggs and continue doing so seven days (average). These will hatch on an average in seven and a-half days. Spraying, therefore, must be started within twelve days of this event. But the full effectiveness of this, the first spray, will also depend on the apple blossoms having just dropped their petals, and whilst as yet the calyx-lobes have not turned in to close the outer calyx, cups in which the young "worms," if present, feed. Other considerations point to the necessity of a second spray when ten days from the first spray have just elapsed.—H. Tryon, Entomologist in Chief.)

Apple Weevil *(Doticus pestilans).*

Several instances of the occurrence of this little beetle (in the larval condition) in dried and mummified apples have been brought to my notice during the last few weeks. On breaking open a dried apple or quince the grubs or larvæ of this insect may be often met with, and they have (presumably owing to their situation) even been mistaken for fruit fly grubs.

The beetle, which is about 3/16 inch long, lays its eggs in drying or dried fruit, and the young grubs on hatching feed in this until about August, when they turn to pupæ in the tunnels mined by the larvæ; the beetle emerges in early spring. Some under observation hatched on 8th September, 1923. This beetle never attacks sound and healthy fruit, and therefore is not considered to be a fruit pest.

USEFUL INSECTS.

"Hover Flies" *(Syrphidae).*

Several species of these useful flies, belonging to the order Diptera, are now on the wing and waging war on the various destructive aphides—"plant lice." *Syrphus pusilla* is busy among the black peach aphis, and its active larvæ or maggots may be watched devouring numbers of this destructive pest. The Hover Fly larvæ may easily be recognised by their elongated shape, roughened coloured surface, and active movements. When full-grown they attain a length of about ½ an inch, being thick at the anal extremity and tapering to a point towards the head. This they have a habit of lifting and moving rapidly in all directions; they are generally white or greyish white and coloured. The adult insects are broad, flat-looking flies, about ½ an inch in length, and are furnished with strong wings. Their general colour is bronze-black marked and striped with yellow. The common name of "Hover Fly" is very descriptive, as these flies have a habit of remaining almost stationary in mid-air, with rapidly vibrating wings, close to a blossom or to the aphis colonies. When disturbed they will dart rapidly to a new situation and again hover in the air. I have dealt somewhat at length with this insect and its habits, as it is important that the orchardist should learn to recognise these flies as useful insects and among his best friends.

Woolly Aphis Parasite *(Aphelinus mali).*

On 14th August, 1923, the promised consignment of parasitised woolly aphis (*vide* report, June-July) arrived as a gift to us from Dr. R. J. Tillyard, M.A., of the Cawthorn Institute, New Zealand. The material sent was at once taken to the Insectary and placed in the special breeding-box or cage designed by Dr. Tillyard for the purpose of dealing with the insect on being received. At once also one or two aphides were taken from the consignment for examination, and as a living pupa of *Aphelinus mali* was found within the body of one aphis, hope was entertained of obtaining some of the parasites in spite of delay in transit. The weather was cold with almost nightly frosts until about 23rd August, when warmer weather conditions were experienced. Pending the hatching of the parasites, three apple trees harbouring Woolly Aphis had been chosen (and suitably protected from weather, &c.) to act as a nursery for the parasite on its hatching. The situation of these trees is as follows:—One at A. H. Paget's, The Summit; one at H. Lee's, Applethorpe; and one in the orchard of Mr. T. J. Ballanger, Stanthorpe.

Dates of hatching of parasites are as follows:—

Date of Hatching.	Number Hatched.	Male.	Female.
August 29	16	9	7
,, 31	3	1	2
September 4	8	3	5
,, 7	4	2	2
,, 8	4	3	1
,, 10	4	2	2
,, 14	8	3	5
,, 15	4	..	..
,, 18	8	2	6
,, 20	4	1	3
,, 22	2	..	2
,, 24	28	10	18
,, 25	11	..	..
,, 28	3	1	2

Total hatchings to date, 107; approximate number of males, 37; approximate number of females, 55.

With the exception of six preserved for reference and four that perished owing to a damp tube, all the above parasites were liberated on the three aforementioned trees. Of the number, thirty-eight were liberated at The Summit and the remainder at Applethorpe and Stanthorpe. In some instances a gauze sleeve was first placed around a Wooly Aphis infested branch, and the parasites were liberated within this sleeve as an additional precaution against failure in their establishment. Some difficulty was experienced in getting the parasites to walk on to the tree, for they seemed disinclined to leave the tubes. When alarmed or touched they have a habit of jumping, and great care was necessary to prevent this happening; but the

loss of one or two in this manner was unavoidable. I found the most successful way to secure their attachment was to remove the cotton plug from the tube and tap the end of the tube down smartly on to a flat portion of a branch. The parasites would then be precipitated down on to this branch, and after a second or two, the tube being lifted, the parasites would disperse along it. Many were seen to crawl among the Woolly Aphis colonies with evident interest. To accelerate issue from the pupæ of the parasites I found it advisable to keep the air moist in the breeding cage; a fairly large piece of cotton-wool soaked in water and placed in a tin inside the breeding cage will accomplish this. One experiment has been made to test if it be practicable to induce *Aphelinus mali* to attack the Black Aphis of the peach. Thus a branch of the infested peach with individuals of this aphis was netted in with gauze and six Aphelinus liberated among them.*

Dr. Tillyard has stated that Aphelinus will attack any of the dark-coloured aphides, and in respect to the Black Peach Aphis it may therefore be the case.

When once established here, an effort should be made to introduce *Aphelinus mali* to other parts of the State, as it may prove a valuable help in controlling the Orange Aphis and also the aphis of the banana, both of which are dark-coloured insects.

The care and liberation of this parasite—*Aphelinus mali* (with occasional necessary visits of inspection, &c., to orchards)—has occupied my time during the whole of the month of September.—H.J., 2nd October, 1923.

* The economic importance attaching to the first introduction to Queensland of a parasite of the Woolly Aphis of the apple justifies this extended notice of procedures taken following this event, so that if the establishment of *Aphelinus mali* be effected, an efficient method may be known for the guidance of others, and if not, an opportunity be available for ascertaining any modification in them needful.—H.T.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS FOR SEPTEMRER, 1923.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
College Grandeur	Jersey ..	11 July, 1923	480	6·0	33·90	
Hedges Madge ..	Friesian	18 Aug., 1923	840	3·3	32·40	
Prim	,, ..	4 April, 1923	930	2·9	31·20	
Miss Security ..	Ayrshire	8 June, 1923	690	3·9	31·20	
Magnet's Leda ..	Jersey ..	18 Aug., 1923	630	4·0	29·42	
Bellona	Ayrshire	3 Aug., 1923	630	3·6	26·40	
Lady Meg ..	,, ..	14 July, 1923	570	3·8	25·50	
College Cold Iron	Jersey ..	23 April, 1923	450	4·8	25·20	
Songstress ..	Ayrshire	22 Aug., 1923	540	3·8	24·	
College Evening Glow	Jersey ..	5 April, 1923	420	4·8	23·70	
College Prima Donna	Friesian	19 Mar., 1923	600	3·4	23·70	
Rainfall of Marinya	Ayrshire	29 Mar., 1923	510	3·8	22·80	
Comedienne ..	Jersey ..	10 July, 1923	450	4·3	22·50	
College Desire ..	Ayrshire	11 July, 1923	450	4·3	22·50	
Soprano ..	,, ..	14 June, 1923	420	4·5	22·20	
College Damsel..	Friesian	27 April, 1923	480	3·9	21·90	
Lute	Ayrshire	26 April, 1923	480	3·8	21·30	
Lady Loch II. ..	,, ..	26 April, 1923	510	3·6	21·30	
College St. Martha	Jersey ..	25 June, 1923	360	5·0	21·	
Buttercup ..	Shorthorn	7 Sept., 1923	672	2·5	20·64	
Snowflake ..	,, ..	17 May, 1923	510	3·4	20·10	
College Ma Petite	Jersey ..	12 June, 1923	420	4·1	20·10	
Gay Lassie ..	Ayrshire	11 July, 1923	420	4·1	20·10	

ABSTRACTS AND REVIEWS.

Mangolds in Combination with Maize.

SUCCI, A., in "L'Italia agricola," Year 50, No. 8, pp. 265-268. Piacenza, August, 1922.

The writer calls attention to the economic advantage of growing mangolds mixed with maize, a combination which he has tried with success for about twenty years. The mangolds are sown between the lines of maize and at the same time or a little earlier. The two plants spring up and grow together; the maize then develops rapidly and the growth of the mangolds gradually slows down until it stops completely; by degrees as the maize begins to ripen the pressure is eased and the mangolds again begin to grow and after the maize is harvested, develop quite normally.

At this time, the beginning of autumn, the soil is the seat of a powerful chemico-biological activity by which the mangolds are able to profit; they leave therefore to the next crop, which is generally wheat, smaller quantities of fertilising principles and especially of nitrogen; it is therefore necessary to make up the deficiency by abundant manuring of the maize when combined with mangolds or by applying a quick acting fertiliser to the wheat.

That there is no danger of the mangolds dying during the suspension of growth has been ascertained by the writer even in the case of its combination with Caragua giant maize, as well as in southern districts with dry summers and in light mellow volcanic soils.

The combination allows for compensation for the damage which in some years drought causes to the maize, for the reduced growth of the maize allows the mangolds to grow larger.

Lastly, the writer gives the appropriate cultural rules:—The soil to be sown should be crumbled; the space between the lines of maize should not exceed or but slightly that of maize grown by itself—*e.g.*, for early *Reggio* dwarf maize, it should measure 16 to 20 inches; no special attention is necessary for the associated crops; weeding and earthing up are done at the same time; the uprooting and transplanting of the mangolds causes no injury to the maize.

Sugar beet is much less suitable for growing with maize; whatever variety is grown the roots can only be used for feeding cattle; it is therefore better to grow mangolds in combination with maize, as they give a more abundant crop.

The Sowing of Seeds and Scattering of Chemical Fertilisers Simultaneously in Parallel and Close Lines.

BANDRY, A., in "Comptes Rendus des seances de l'Academie d'agriculture de France," Vol. 8, No. 20, pp. 574-580.

Low crop yield is due less to the insufficiency of chemical fertilisers used than to their imperfect utilisation by the crops. It was decided to place within immediate reach of the young plants the mineral nutriment needed by them from the earliest stages of their growth. For fifteen consecutive years the author studied the application to extensive cultures of the simultaneous scattering of chemical fertiliser and seed grain in close parallel lines. The results obtained are as follows:—

(1) The maximum profit in practice from crops, both of cereals and pulse, has always been obtained by using quantities of chemical fertilisers varying from 270 to 360 lb. per acre.

(2) With more than 360 lb. of chemical fertiliser the value of the increase in weight of the crops did not correspond with that of the increase in weight of the chemical fertilisers used.

(3) The yield per acre of useful dry matter from the crops obtained by using 180 to 360 lb. of chemical fertilisers spread in lines has been at least equal and often superior to that obtained on the same soil by using 540 to 900 lb. of the same fertilisers distributed in the usual way.

(4) Chemical fertilisers sown in lines at a depth of 1 to 1¼ inches in close proximity to the seed have a beneficial effect on the young plants.

The author concludes that this method of rational utilisation of chemical fertilisers is so effective that it has become possible to reduce the quantities hitherto judged necessary to ensure the maximum practical profit from crops by 50 to 60 per cent.

Influence of Irrigation on the Composition of the Soil.

GREAVES, J. E., in "Journal of the American Society of Agronomy," Vol. 14, No. 5, pp. 207-212, bibliography of seven works.

Water has a double action on the soil. It assists or hinders the normal development of the processes in the soil, and its most manifest influence is over the process of nitrification, of which the maximum is attained when the soil contains 60 per cent. of its water-holding capacity. Above or below this concentration there is a decrease; and nitrification ceases when the quantity of water reaches or exceeds 90 per cent. As regards nitrification, therefore, an excess of water is more detrimental than an insufficiency. Under good moisture conditions, from 50 to 100 lb. of nitric acid may be produced in an acre of soil during a season; it is a well-known fact that this acid is of great assistance in the liberation of phosphorus and potassium. The moisture content acts similarly, but in a less degree, on ammonification, the maximum production of which is also reached when the soil contains 60 per cent. of its total water holding capacity. All the other processes which take place in the soil are also dependent on its water content; for instance, the production of carbonic acid gas; it also plays an important part in the solution of tricalcium phosphate. Finally, it influences the production of lactic, acetic, butyric, sulphuric, and other acids, which help to dissolve potassium, &c.

The other fundamental action of irrigation water is that it brings or carries away plant food; it impoverishes or enriches the soil. To gain an idea of the enormous quantity of substances that water may carry off from the soil, it is only necessary to consider the constituents of river water. The substances in solution such as, for instance, sodium chloride, are not generally of any importance in agriculture, but useful substances, such as potassium, nitrogen, and phosphorus, are not lacking. The writer describes certain analyses on this question. Some irrigation drain waters are still richer; certain of them contain as much as 133 lb. per acre-foot.

When irrigation is carried out properly, the water, as it evaporates, deposits the substances it contains, as in the case of the Nile. Thus, in Utah, the waters used for irrigation contain 0.79 to 59.0 parts of potassium per million, or an average of 5 parts which may be used by the soil. Irrigation waters contain, besides potassium, nitrogen and other useful soluble substances; they are therefore capable of improving the soil. The great point is to irrigate *in moderation* in order not to *wash out* the soil. Irrigation may transform the desert into a garden or render the most productive fields barren, according as it is well or ill done.

The Radio-Telephone as a Means of Distributing Weather Forecasts, Crop Reports, and General Agricultural News.

I. "Journal of the Ministry of Agriculture," London, August, 1922, p. 444.

II. " The Dakota Farmer," 1st March, 1923, p. 231.

In England, in France, and in the United States the wireless telephone has already, to a more or less extent, been brought to the assistance of agriculture. The feasibility of using wireless telephoning in this connection has been amply proven, and the results have been satisfactory.

The British Air Ministry issues daily by means of radio broadcasting a number of weather reports of considerable use to the farmers, and a pamphlet giving particulars concerning these messages has been distributed. Special forecasts are also issued during the harvest season.

The National Meteorological Office of France broadcasts weather bulletins from the station on the Eiffel tower twice daily. Every commune is to have a receiving station in the parish school, police station, or at the home of some chosen person, where the messages will be received and posted. The messages are communicated in the district by the ringing of a bell—no ringing if there is no change of weather, three strokes to announce rain, six to announce frost, ten to announce storms or hail. In England, where the farm houses are more isolated than in France, it is proposed that the messages be received at suitably chosen towns, and redistributed from them to villages and to farms in possession of the cheap wireless receivers already at the disposal of the general community.

The United States Department of Agriculture has organised and developed a comprehensive radio programme that covers the entire country. This service includes market reports, weather information, and general agricultural news. At the present time the radio crop and market news service of the Bureau of Agricultural Economics is handled by four high-powered radio-telegraph stations of the Navy Department,

five strong radio-telegraph and one radio-telephone station of the Post Office Department, and seventy-eight radio-telephone stations belonging to colleges, State Agricultural Departments, electrical companies, newspapers, stockyards, and other interested concerns.

In July, 1922, there were ninety-eight stations in thirty-five States broadcasting daily weather forecasts and warnings by radio-telephone. Weekly reports on the effect of weather on crops and highways, and other information issued by the Weather Bureau are also disseminated by the station.

An international weather information service and crop reporting service is also being built up. A daily radiogram is sent to the French Meteorological Service and broadcast from the Eiffel tower all over Europe. The Weather Bureau receives radio reports from European countries in exchange. Crop reports are exchanged with the International Institute of Agriculture at Rome and with the Egyptian Government.

Another service consists of a number of short speeches on various agricultural topics which are broadcast from the Naval Radio Station at Arlington, Va. Educational talks on all subjects pertaining to farming are broadcast by private stations.

The United States Department of Agriculture does not operate any wireless equipment, but the radio distribution work is carried on through stations operated by other Government Departments, by corporations, and by private individuals.

The prices being paid for cash grain as well as for grain for future delivery in the Exchange Room of the Chamber of Commerce of Minneapolis, are now being broadcast throughout the north-west of the United States by radio. The following quotation from ''The Co-operative Manager and Farmer,'' February, 1923, shows how this is done:—

''The Minneapolis Chamber of Commerce quotations are being broadcast through the courtesy of the North-Western National Bank, one of the subscribers above mentioned. The time schedule of these quotations is as follows:—At 9.40 a.m. the ''opening'' prices of grain and flax for ''future delivery.'' At 10.30 and at 11.30 a.m. the ''going'' prices of grain and flax for ''future delivery.'' At 1.30 p.m. the ''official closing prices'' of cash grain and flax, also grain and flax for ''future delivery.'' This schedule applies to every business day, including Saturday.

''A Western Union 'ticker' or type recording telegraph instrument has been placed in the transmitting room of the Oak Grove station by the Chamber of Commerce Quotations Committee. This instrument is connected directly with the so-called piano grain ticker transmitter located in the Exchange Room of the Chamber of Commerce of Minneapolis. The operator of this piano grain ticker transmitter delivers to the Oak Grove station the grain prices above mentioned, and these prices appear in type upon the 'tape' which is constantly issuing from the ticker in the Oak Grove station. The operator at the Oak Grove station immediately broadcasts these prices over the north-west by radiophone.''

The Chicago Board of Trade also broadcasts market and crop news from a powerful sending station. In fact, all the facilities of the vast crop-reporting system of the Board are now placed at the disposal of the farmer free of charge. And these facilities are one of the marvels of modern commerce.

Electric Windmills.

PETTRE, F. Des Aeros electriques. ''Journal d'Agriculture pratique,'' Vol. 35, No. 38, pp. 258-9, Paris, 1922.

Windmills when fitted with suitable transmission can be made to drive a compound dynamo of special construction, so as to produce a nearly constant voltage with different speeds of rotation, and thus provide light for all the buildings on a farm. With windmills made to produce an electric current, the velocity of the wind must be at least 2.50 miles per second, as otherwise the dynamos do not furnish sufficient voltage. Therefore, storage batteries of fairly large capacity are necessary in order to store up the reserve energy produced by strong winds, and thus provide the force required for lighting. An automatic relay allows of the storage batteries being charged under different tensions.

The Oil-Bearing Sunflower on the "Riviera di Ponente," Italy.

PERSICO, W., in ''Costa azzurra Floreale-Agricola''; reprinted in ''Bolletino dell' Associazione italiana pro Fiante medicinali, aromatiche ed altre utili,'' Year IV., No. 10, pp. 155-156.

The author recommends that the large, one-flowered, so-called Russian variety of *Helianthus annuus* should be grown as oleiferous plant in the Riviera di Ponente, as

its product is quite equal to olive oil. Very satisfactory trials have been made in the experiment vineyards and rose gardens of Pietralunga, where it has been found that about twenty quintals of seed per hectare may be expected. The seeds give 15 per cent. of oil and 80 per cent. of sunflower-seed cake, or 3 quintals of oil and 16 quintals of cake per hectare. Without irrigation, some plants, 46 cm. in height and with heads 46 cm. in diameter, were obtained.

The seeds of the sunflower are not only used for cakes, and in a variety of other well-known ways, but also supply an excellent flour for cake-making, while the stalks furnish a silk-like fibre and an ash with a high potash content. A brilliant yellow dye is obtained from the petals, and the leaves are used instead of those of *Datura Stramonium* as a remedy for asthma.

Beef Production.

''Live Stock Journal,'' United Kingdom, 10th August, 1923.

The first thing that should be looked to in a beef animal is the general form—low, broad, deep, smooth and even, with parallel lines. No wedge shape is wanted for the block. Next in importance is a thick, even covering of the right kind of meat in the parts that give the high-priced cuts. This is a very important factor in beef cattle that is often overlooked. By the wholesale method of cutting beef about 28 per cent. of a good carcase of beef sells for nearly 64 per cent. of the total value. The high-priced cuts are the ribs and loins These parts on an average sell for about three times as much per lb. as the others. Good, broad, well-covered backs and ribs are absolutely necessary to a good carcase of beef, and no other excellences, however great, will compensate for the lack of this essential.

It is necessary to both breed and feed for thickness in these parts. And mere thickness and substance here are not all. Animals that are soft and patchy, or hard and rolled on the back, are sure to give defective and objectionable carcases, even though they are thick; and they also cut up with correspondingly greater waste. The men who buy cattle and fix their market value are shrewd enough to know almost at a glance how much and just what kind of meat a steer, or carload of steers, will cut out, and if the producer overlooks any of the essential points he is compelled to bear the loss.

Then, in addition to securing the general beef form and make-up, together with good backs, ribs, and loins, there is a certain quality, character, style, and finish that constitute an important factor in determining the value of beef cattle. One of the first indications of this is to be found in the skin and coat. A good feeding animal should have a soft, mellow touch, and a fine but thick and heavy coat. A harsh, unyielding skin is an indication of a sluggish circulation and low digestive powers. The character and finish exemplified by a clear, prominent, yet placid eye, clean-cut features, fine horn, and clean, firm bone, all go to indicate good feeding quality and a capacity to take on a finish of the highest excellence, and consequently to command top prices. Do not tolerate too large or too coarse bone. Coarse-boned, rough animals are almost invariably slow feeders and hard to finish properly. A certain amount of size is necessary, but it should be obtained without coarseness. The present demand exacts quality and finish rather than size. Besides these qualities, and above all, it is necessary to have vigour and constitution. We find evidence of these in a wide forehead, a prominent brisket, broad chest, full heart girth and general robust appearance, and without them other excellence will not have its highest significance.

Attention is called, by way of emphasis, to the necessity of having the right kind of cattle to insure a profit, or rather to avoid a loss. There is not a very great difference in the rate of gain, or the number of pounds of increase in a weight from a given quantity of feed, that will be made by a representative of the best beef breeds and a genuine scrub. This is a fact that practical breeders and improvers of live stock were slow to accept at first. In fact, they did not accept it until it was repeatedly demonstrated. After all, there is no well-founded reason why a Shorthorn or a Hereford or an Angus should make more gain in weight from a bushel of corn than a scrub. This is governed altogether by the digestive and assimilative machinery of the steer. The despised scrub usually has a digestive system like a goat, and is always hungry. Scientists have discovered that civilised man has no greater powers of digestion than the barbarian or the Indian. Neither has the improved steer better digestion than the native. The feeder is often deceived in the belief that he has a good bunch of cattle simply because they feed well and gain rapidly. Economy of production is an important factor, but it is by no means all. It is even more important to have a finished product that the market wants and will pay for than that it simply be produced cheaply.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations has received the following report (23rd October, 1923) from the Entomologist at Meringa, Mr. Edmund Jarvis:—

PARA-DICHLOR. EXPERIMENTS AT MERINGA.

Summary.

The experiment plots at Meringa consisted of a strip of land 605 feet long, embracing eight rows of first ratoons of D.1135 and ten untreated rows. Injections of para-dichlor. were put in on 25th January with the "Jarvis Injector" (designed for injecting dry materials) on both sides of cane rows, from 12 to 18 inches apart, 6 inches deep, and 4 inches from stools. Owing to the land having been cultivated to an average depth of 6 inches the crystals of para-dichlor. were in many cases embedded in unbroken soil.

A fortnight later the odour of the fumigant was noticeable 2 inches below injections, and had penetrated upwards to the surface, impregnating a strip of land about 20 inches wide situated directly under the lines of stools. This fumigation of the soil had been accomplished by an evaporation of only one twenty-fourth of an ounce of para-dichlor. (one-sixth of the ¼-oz. injection) still leaving sufficient in the soil (five scruples) to maintain such fumigation for ten weeks longer. Three months after application the cane was 7 to 8 feet high, and upon looking down from a height of about 12 feet one could at once notice the green edges of treated areas sharply bounded by the yellowing borders of the grub-infested check plots.

At this time not a single yellow patch could be seen in the treated area, the cane in which continued of an uniform dark healthy green. When examined three weeks later (17th May) this contrast between green and yellowing grub-smitten cane had become very marked indeed, and upon counting the stools in six treated and the same number of check rows it was found that out of 1,800 treated stools sixty-nine appeared to be grub-affected; while in the six untreated rows 1,354 out of 1,800 stools were decidedly grub-smitten.

The sickly stools occurring in treated rows were surrounded by or growing alongside green healthy stools, thus indicating that such occurrence was in many cases not due to failure of the fumigant, but to defective treatment, or to non-application, owing to certain stools having been accidentally missed. This was very clearly exemplified by a row of 300 stools injected by the one man, which presented an unbroken line of green foliage without a single grubby stool, showing that this row had been carefully and uniformly injected throughout the entire length. Running parallel to it and only 4 feet 6 inches away, the edge of an adjoining check plot formed an almost continuous row of stunted grub-eaten cane. The unmistakable contrast between these two rows was amply sufficient in itself to prove the value of para-dichlor. as a fumigant for cane-grubs.

Successful in Spite of Disadvantages.

I may state that these plots were situated on a ridge of high land composed of friable red volcanic soil; that the cane on the area selected for treatment had not ratooned well, owing to injury during the previous season from grubs and dry weather; and, moreover, gaps of several feet occurred in places, while in other parts of these experiment plots the ratoons were weakly or stunted both on the treated and check areas.

The cane was cut about the middle of September, seven and a-half months after injection with para-dichlor., during which period it received less than half our average amount of rain. In spite of prolonged drought, however, poor cultural conditions, and the other drawbacks already mentioned, the rows of treated stools continued to the last to be greener, more upright, and considerably higher than those alongside on the control areas.

How Para-dichlor. was Procured.

It should be mentioned here that the fumigant in question was first obtained from Germany by the Agricultural Chemist, Mr. J. C. Brünnich, F.L.C., who subsequently handed a sample to the present Director of the Sugar Bureau. This was sent to the Gordonvale laboratory to be tested in connection with cane-grub control. At that time (1915), when initial experiments were carried out by the present writer, and proved successful, para-dichlor. had never been experimented with in other

countries as a possible remedy for root-eating scarabæid cane grubs; so that we may claim to have been the first to discover an effective fumigant which bids fair to be of great value as a controlling factor against one of the most notorious insect enemies of sugar-cane.

Ratooning of Treated Rows.

In conclusion, it may be stated that about a month after harvesting the cane on our Meringa plots it was noticed by Assistant H. Knust that the stools treated ten months ago had ratooned in a normal, uniform manner along these rows, whereas in the lines of untreated cane scarcely any ratoons had appeared, while the few present here and there were noticeably small and weakly, indicating plainly that the roots of these control stools had been more or less destroyed by grubs.

Entomological Exhibit at Ingham.

The Sugar Bureau was represented this year for the first time at the Annual Show of the Herbert River Farmers' League, held at Ingham on 21st and 22nd September, by an Entomological Exhibit which included some of our best diagrams and showcases, lately executed by the writer for our Museum at Meringa Laboratory.

This economic display was committed to the care of Mr. Dormer, and owing to its unique character naturally attracted considerable notice, and was evidently much appreciated by growers in the district.

BREEDING AND LIBERATION OF TACHINID FLIES.

This work is progressing favourably, and at the present time one of our breeding-cages contains a large number of canes that harbour pupæ of this parasite, from which the flies are expected to emerge in considerable numbers during the next few weeks.

On the 19th ultimo Mr. G. Bates (Assistant to Entomologist) was sent to South Johnstone to liberate sixty parasites on plantations affected by the beetle-borer (*Rhabdocnemis obscuris* Boisd.).

Thirty-three of these were let go on the selection of Mr. Darviniza, and the remainder among Mr. Moule's cane at Miskin's Point.

Judging by information gathered by Mr. Bates, this cane-borer is to be met with over a very large portion of the South Johnstone district, the names of no less than sixty growers who are troubled with this pest having been obtained from the Chief Cane Inspector.

This is a serious matter, and an endeavour will be made without delay to control the ravages of this destructive cane-weevil.

Cane-grubs have not done much damage this season on the Johnstone, and other insect pests affecting the cane are of minor economic importance.

DRIED GRUBS AND BEETLES AS A POULTRY FOOD.

Whilst in Sydney recently I submitted samples of dried grubs and grey-back beetles to Mr. A. Le Souef, Curator of the Zoological Gardens, and we visited cages containing various insectivorous birds, &c., to see if they would eat the grubs when broken into small pieces.

Mr. Le Souef subsequently found that they preferred them in a softened condition, and in a letter just received from him he writes:—

> "The grubs that you left were very good food, and when soaked were readily taken by our insectivorous birds. We would be glad if you would quote for the food at per pound. We might be able to use about 100 lb. per annum."

I might mention that when discussing this matter with the Curator he told me that there was a sure market in Sydney for such dried grubs, and we would have no difficulty in disposing of large quantities at a good price. The price per pound would be determined by the amount of trouble and time involved in the process of drying and packing the grubs. It seems to me that growers who collect them when ploughing might just as well turn them to profitable account as throw them away or let birds eat them.

Since it takes about 3½ lb. of fresh grubs to make 1 lb. of dried, a fair price for the latter commodity would be from 2s. 6d. to 3s. per lb.

RED POLL CATTLE.

To-day Red Poll cattle are among the favoured breeds in the dairying counties of Great Britain and in all the provinces of Ireland. They are established and esteemed in America, South Africa, the islands of the Pacific, New Zealand, and Australia.

In Queensland a notable Red Poll herd has been founded by Mr. E. J. McConnel, at Marshlands, Wondai. At the last Brisbane Show, Red Polls were not the least interesting entrants in the cattle classes, and representatives of the Marshlands herd won championship ribbons.

They have proved their worth for high quality milk production and butter and cheese making; also their excellence as beef producers. These and other utility characteristics have contributed to a widely growing interest in the Red Poll breed.

Possessing the good points of a dairy animal, and being able to hold its own with the best beef cattle, it is only natural that the Red Poll should continue to make steady progress in popular favour. Among those who have come into the Red Poll ranks are many one-time owners of heavy milking cattle, who have been impressed by the general utility character of the breed. They are finding what is so important to the general farmer to-day that cattle are invaluable if a uniformly high percentage of butter-fat always in the region of 4 per cent. can be relied upon, and if early maturity in the steers can be looked for. These considerations have contributed to the increasing interest in the Red Poll breed.

Origin of the Breed.

Pedigree Red Polls were selected originally from poll cattle highly esteemed in the eastern counties of England. Many of the foundation stock were red, but many more were variable in colour. In appearance they were generally like de-horned Shorthorns. The blood-red colour was held in the highest favour, and many farmers in Suffolk and Norfolk were found early in the last century to have herds entirely red and to have been careful to breed from red bulls.

There is no record of any Red Polls kept in any other counties in Great Britain at the time when pedigrees were first listed. An old strain of this breed exists in a remote part of Austria. These, no doubt, are descended from animals of the Elmham herd, in Norfolk, exported in 1869 to infuse fresh blood into native-bred cattle.

Records show that Red Polls existed in Suffolk in 1792, and earlier than that reference was made to the butter they produced being "the pleasantest and best in England." In those days little if any attempt was made to improve the breed until the agricultural societies were established and premiums offered for Suffolk cattle pure bred—*i.e.*, by a Suffolk bull *ex* a Suffolk poll cow.

Although there were poll cattle of various colours both in Norfolk and Suffolk, the red was held in highest esteem as long ago as 1782. In a "Rural Survey of Norfolk" about that period, the native cattle are described as "a small, hardy, thriving race; fatting as freely, and finishing as highly at three years old as cattle in general do at four and five."

The establishment of separate classes for Norfolk poll cattle at the agricultural shows in that county gave great impetus to the improvement of this stock.

Red Polls are recognised to be a smaller breed than Shorthorns, Friesians, South Devons, or Herefords. An average cow's height is 4 ft. 2 in., and girth 6 ft. 6 in. They are docile and feed without fuss. The beef is of the same value as that of the Aberdeen Angus.

Photo. F. B. McConnel.]

PLATE 98.—ROYAL FARMER'S SON BEING CONGRATULATED ON HIS WIN AT THE BRISBANE SHOW.

Photo. F. B. McConnel.]

PLATE 99.—ANOTHER SON OF ROYAL FARMER COCKS A CASUAL EAR TO HIS VISITOR.

Photo. G. B. Brooks.

PLATE 100.—EIGHT-LOCK COTTON BOLL FROM MOUNT LARCOM DISTRICT.

The usual number of locks found in cotton bolls of American type in Queensland is either four or five, and the boll depicted is an interesting departure from the normal.

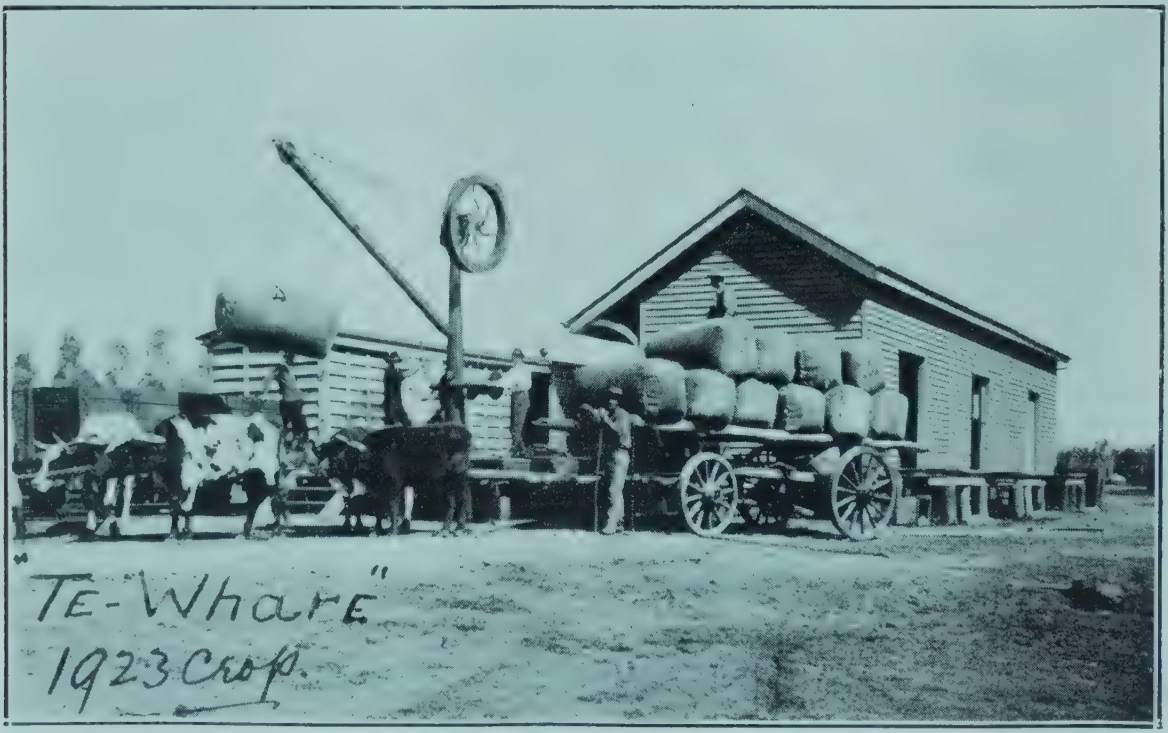

PLATE 101.—COTTON FROM TE-WHARE, MR. GEO. W. ROSEBY'S FINE PROPERTY IN THE WONDAI DISTRICT.

Mr. Roseby had the largest one-man ploughed cotton area in Southern Queensland—42 acres—this season. Average weight per bale, 586½ lb.

General Notes.

State Wheat Board Election.

The following nominations have been received for membership of the State Wheat Board for one year as from 2nd December, 1923:—

R. Swan
A. J. Harvey
B. C. C. Kirkegaard
T. Muir
J. T. Chamberlain

As there has been no opposition the whole five are elected, but the actual appointment of the Board has yet to be confirmed by the Governor in Council. All nominees have held office on the Board for the current year.

Tomato Pool.

A notice of intention of His Excellency the Governor to create a Tomato Pool for the Stanthorpe District appears in the "Government Gazette" of the 3rd November. The pool will be run on similar lines to the one which operated at the beginning of the year. The new pool will operate from the 7th January to the 26th April, 1924, and will apply to all tomato growers in the Stanthorpe District, with the exception of these growers who deliver their tomatoes to a co-operative factory within the district. The franchise for the pool is given to those persons who grew tomatoes last season or who have transplanted plants for the coming season. The Board to administer the pool will consist of three members. An Order in Council extending the term of office of the members of the present Tomato Pool Board to the 15th November has also been gazetted. This extension is given in order to allow the Board time to finalise the accounts of the last pool.

Queensland's Future—A Southern View.

Thus a writer in the "Australasian" (20th October, 1923) in the course of a review of the fruit industry in Queensland:—"The future certainly appears brighter than for many years. The change has been brought about by the Government of the State having realised that the fruit industry is capable of great development. Grants to the Department of Agriculture have increased from time to time, and again this year the amount has been added to by approximately £50,000. Steps have been taken to enable investigation to be made of the causes which have operated against the success of the industry. Last year an officer was appointed to devote special attention to this branch of the departmental activity. Then followed the appointment of an instructor in packing, and the carrying out of demonstrations and lectures dealing with the different phases of the industry. These changes are having their effect, and, as a consequence, those engaged in the industry are giving much increased attention to the cultivation, manuring, and general management of their properties. Nurseries have been established by the Government, at which new varieties are being propagated, and efforts are made to improve commonly grown kinds of fruit. At one of these some thousands of trees of the Avocado pear are being propagated, with a view to testing its commercial value. In the southern zone apple and other deciduous fruit trees are being planted over a wider area, whilst the question of erecting packing houses is receiving attention. All these activities indicate that fruit culture is likely to make pronounced progress in the immediate future."

Queensland Fruit in the South—Clamant Need of Market Organisation and Advertisement.

The same writer continues:—"The outstanding feature of the fruit industry is the little attention that has been given to the creation of a Southern market for the disposal of the more delicate fruits, such as the pawpaw, custard apple, granadilla, and the mango. These fruits are prominently displayed in the Sydney shop windows, and, to a far less extent, in Melbourne. The Queensland grower does not appear to have fully realised the possibilities of these fruits, and it may truthfully be said that the retailer has not extended the assistance that might be expected of him when consignments have to be made. The high prices have, in place of popularising these fruits, caused them to be regarded more as some freak product, that is placed in the window more for dressing purposes than for the purpose of sale. A well sustained advertising campaign, backed up by regulation of supply, would do much to bring these fruits into considerable popularity. Last season Tasmanian orchardists instituted a 'Sturmer' week in Sydney, and as a result of the window displays and inducements offered to retailers and barrowmen to push the sale of the fruit, 80,000 cases of this apple were sold within a week. A campaign on somewhat similar lines would do much to develop a permanent market for the more delicate tropical fruits."

Top Rot of the Sugar-cane.

Bulletin No. I. of the Division of Pathology, issued by the Bureau of Sugar Experiment Stations, and covering an inquiry into the nature and origin of a disease affecting sugar-cane in the Herbert River and other districts of Queensland, by Mr. Henry Tryon (Plant Pathologist and Entomologist, Department of Agriculture and Stock), is now available for distribution to sugar-growers and others interested.

Wheat Board—Insurance.

A Proclamation has been issued under "*The Wheat Pool Act of* 1920." This Proclamation provides that the Wheat Board, for the purpose of insuring wheat against damage by fire, shall be deemed to have and retain an insurable interest in all wheat retained by the growers for feed or seed purposes, or wheat which is sold by the Board to growers for either of these purposes.

Disparities Revealed by Testing.

The economic significance of records in relation to the production of dairy cows is well illustrated by figures obtained from tests carried out at Utah Agricultural Experiment Station. The "International Review of the Science and Practice of Agriculture" sets out the quantities and values in currencies not familiar to other countries, but the differences between the yields of the cows which were proved to be the best and those proved the worst are equally arresting, whether stated in kilogrammes or in pounds.

The records of twenty-six herds of dairy cows for a biennial period ending in 1913 proved that the difference between the annual production of butter of the best and the worst cow of a herd ranged from 18 to 148 kilogrammes. There was no correlation between the production of the first three months and the annual production. There is a decrease in yield when the cow remains dry for more or less than two months. A dairy cow of a good breed shows a marked tendency to long lactation; she is as superior to a poor cow in annual butter production as in butter production during the first month.

Comparison between the best and the worst herd showed that the annual butter production of the best herd was 149.9 kilogrammes as against 89.4 for the worst. The cost of feed per annum was 229.01 francs as against 177.29, leaving a profit on the cow of 362.57 francs for the best herd, as compared with only 174.18 for the worst.

Importance of Standard Grades—A Warning to Fruitgrowers.

The importance of obtaining satisfactory markets for our fruit is being constantly brought under the notice of fruitgrowers, not only in this State, but generally throughout the Commonwealth, and it has been pointed out over and over again in the Press and otherwise that the only way to obtain and retain markets is to ensure that the quality of the fruit supplied is up to the standards set.

The importance of this has been recognised by the Council of Agriculture by its decision on the advice of the Banana Advisory Council, to recommend to the Government the fixing of standard grades for Cavendish bananas. These suggestions were approved by the Government, and in February last Regulations which provided that cases containing fruit must be clearly marked with the grade of their contents were gazetted. Unfortunately, some growers do not even yet realise the importance of their so grading their fruit or the injury, either wilfully or through ignorance, that they do their fellow-growers by improper grading.

An instance of improper grade marking was recently brought to the notice of the Department of Agriculture. A case of bananas marked "Firsts" (which means that the fruit must not be less than 7 inches in length or less than 4 inches in circumference) contained half-size fruit. The consignment was not a credit to Queensland, and in sending it to the Southern markets the offending grower undoubtedly helped to seriously prejudice buyers there against Queensland bananas. The fruit referred to and marked "Firsts" was so small as to be below any grade standard and quite unmarketable.

Growers are again warned that the grade standards, as provided for by Regulation, must be complied with, and that the markings on the case must be a true description of the grade of the fruit contained therein, and that inferior fruit must on no account be graded and marked "Firsts."

Banana-growers are, therefore, again advised to be more careful in the grading of their fruit, and to be absolutely certain that the fruit packed in a case is in accordance with the grade standard marked thereon. If this is done the confidence of the buyers will be secured and there will be no difficulty in disposing of our fruit.

Do Thunderstorms Affect Milk ?

It is a popular belief that thunderstorms sour milk, a belief so widespread that it would seem there must be some foundation for it. It is questionable, however, whether there is really any connection between the thunderstorm and the souring of milk. That souring frequently occurs during a thunderstorm cannot be doubted.

After much experimenting with electric sparks, &c., scientists have come to the conclusion that bacteria grow most rapidly in the warm, sultry conditions which usually precede a thunderstorm, and it will frequently happen that the thunderstorm and the souring occur together, not because the thunder has hastened the souring, but rather because the climatic conditions which have brought the storm have at the same time been such as to cause unusually rapid bacterial growth.

Dairymen find that during hot, close weather, even when there is no thunder, it is just as difficult to keep milk as it is during thunderstorms, and they also find that scrupulous cleanliness in regard to the milk vessels is a good remedy against souring during a storm. It is safe to conclude, therefore, that in all cases it is the bacteria which sour the milk, and if there seems to be a casual connection between the souring and thunder it is an indirect one only. Milk should be cooled as soon as possible after milking, when it will keep sweet for a reasonable period, while milk deprived of bacteria will keep well during thunderstorms.—''The Dairy.''

Government Clydesdale Sires.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has made available for public information the report of arrangements and investigations for this season made by the Stallion Committee appointed in connection with the Clydesdale sires purchased by the Government to help towards the improvement of draught stock in Queensland. Applications for the use of these stallions were received from districts other than those to which a horse has been allotted, but, as the number of horses is limited, it is impossible to accede to all requests this year. The sires have been allotted as follows:—

''Glenalla''—Rosewood, Marburg, and Rosevale.

''Fabric's Heir''—Boonah and Harrisville.

''General Wallace''—Clifton, Allora, Warwick, and Nobby.

''Premier Again''—Wallumbilla and Roma.

''Bold Wyllie''—Nanango, Kingaroy, Wondai, and Murgon.

''Baron Again''—Gympie, including the Mary Valley.

As it was originally the intention of the Stallion Board to allot a stallion to the Oakey district, taking in the Cecil Plains line, an inspection was made of the mares submitted in and around these centres. Full publicity as to the date and time of the inspection was given in the local papers, but owners of mares failed to respond to the opportunity. It was ascertained, however, that the dry weather conditions were largely responsible for the poor response. This district has suffered severely from the drought, and most of the working stock is now on relief country. While it is regrettable that a horse is not available for these districts this season, it is fully realised that farmers more favourably situated should, under the circumstances, have the benefit of the services of the sires.

The Boonah residents, being desirous of securing a horse for their district, took upon their shoulders the responsibility of guaranteeing a full season for a horse as well as the total amount of the service fees. Accordingly, upon representation being made to the Department of Agriculture by stockowners in that territory, an inspection of mares was made, and of the sixty-eight submitted, fifty-eight were accepted. Within the Rosewood, Rosevale, and Marburg district, sixty-eight mares were inspected, and of this number fifty-eight were accepted. The Clifton district responded with a total of eighty-five mares, and of this total sixty-five were accepted. The residents of Wallumbilla and Roma submitted seventy-two mares for inspection, and out of this number only ten were refused. In the Kingaroy district, seventy-seven mares were brought forward for inspection, and fourteen refused. Four mares came forward from Goomeri, but as it is rather far to travel a horse to Goomeri for only four mares, it was deemed advisable by the Board to leave these mares out of the complement for the horse allotted to the Kingaroy district, but the owners of same may secure his services if they provide paddock accommodation for their mares at, say, Murgon. Fifty-four mares were brought along for inspection in the Gympie and Mary Valley district, and of this number forty-eight were passed as eligible.

The fact that a mare has been rejected does not signify in some cases that she is unfit as a breeder, but owing to the number submitted, it was found necessary to limit owners to one mare each where advisable.

Appointments.

W. C. Keany has been appointed Poultry Instructor, Department of Agriculture, and commences duty on Monday next.

J. Carew has been appointed Senior Field Assistant on probation, Cotton Section, Department of Agriculture and Stock.

A. A. P. Daniels has been appointed Learner, on probation, Chief Office, Department of Agriculture and Stock, as from 17th October.

A Bad Policy.

Complaints are still being received by the Director of Fruit Culture (Mr. A. H. Benson) that bananas are being sent to country centres in a very immature condition. Mr. Benson advises that this is bad policy on the part of the growers, for not only do they obtain a comparatively small price for the fruit, but the practice is bound to react on the sender. Immature fruit tends to put buyers off, and consumption is thus limited.

Stacked Silage—A Marburg Farmer's Forethought.

The value of conserving fodder has again been illustrated, this time in the Marburg district. Incidentally, it is shown that stacked silage will, with care, keep longer than a year.

The Instructor in Agriculture (Mr. A. E. Gibson) has received a letter from the Inspector of Dairies (Mr. A. K. Henderson), of Rosewood, in which it is stated that when in the Marburg district a few days ago he visited the property of Mr. S. Smith, of Woodlands, to see the ensilage stack. In May, 1920, Mr. Henderson supervised the erection of this stack, putting in a crop of wilted corn, some of which was so dry that it had to be watered. After nearly three and a-half years there was about 18 inches of waste on the ends and sides, and about 9 inches on the top. More than half of the crop of waste corn had been saved as good fodder, the ensilage being of good quality. Mr. Smith said that he was so satisfied with the results that he had arranged for the erection of a concrete silo this year. He had fed a herd of twenty-six milkers for three weeks and had enough silage left for another week at least.

Mr. Gibson adds that the fact that stacked ensilage will keep much longer than twelve months, obviates the need of erecting a rather costly concrete silo, and removes any excuse for neglect by the farmer to lay by in the years of plenty for the dry period which invariably recurs. The conservation of ensilage should, like the making of hay, be regarded as an annual job.

I.M.S.—Conditions of Herd Book Entry.

The hon. secretary of the Illawarra Shorthorn Society of Australia (Mr. R. S. Maynard) writes:—"Every now and then I get inquiries as to the conditions of entry in the Illawarra Milking Shorthorn Herd Book of Australia, and I think it might be useful to your readers if you allowed me to set down the conditions as they are to-day and as they will be after the end of this year.

"At the present time a cow or heifer is eligible for registration if she be of good type and conformation, and if it be shown to the satisfaction of the Society's inspector that her sire and dam and grandsire and grandam on both sides are or were of good Illawarra Milking Shorthorn type and breeding. In addition, this cow or heifer must pass a certain butter-fat test.

"A bull is eligible for entry if he have similar pedigree qualifications, if he pass inspection on type, and when four of his daughters are registered.

"This condition of entry will not obtain after the 31st December, 1923. From the 1st January next there will be accepted only animals which are the progeny of animals already registered, but the Society will accept, for its Grading-up Register, any cow without pedigree which passes inspection on type. The principle of this Grading-up Register is that a man must use a registered bull on his foundation cows and on succeeding generations, and that he will be able to register the great-great-grand-daughter of his foundation cows in the Herd Book.

"I shall be very happy to send full particulars of this grading-up system to any of your readers who considers that he has first-class unpedigreed cows of this breed and who would like to grade them up for the Herd Book. The Society exists for the improvement of the breed in Australia and for recording the pedigrees and desirable qualities of the specimens of the breed. It is anxious to further the interests of breeders of Illawarra Milking Shorthorn cattle."

A College on Wheels.

"The people greatly appreciate this form of instruction," is a sentence in an interim report from Charleville received by the Minister for Education (Hon. John Huxham) in regard to the work of the travelling domestic science rail car, which is now operating on the Western line. Mr. Huxham states that the scheme is proceeding satisfactorily. The second car is expected to be ready almost immediately, but in view of the close approach of the Christmas vacation this car will not be put into commission in the North until the New Year.

Co-operative Associations Act—Ministerial Statement.

The Hon. W. N. Gillies (Minister for Agriculture and Stock), in the course of a recent Press statement in reply to some criticism of the Co-operative Associations Act, said that, in respect to the suggestion that the measure involves repudiation because it provides for members present at a meeting to have one vote only, all practical co-operators or students of that movement will agree that the one member one vote principle is universally accepted wherever true co-operation is in existence. As stated by him in the House, co-operation is an association of individuals for a common purpose and is not an association of capital for profit; that being so, the voting should be according to the number of individuals and not according to the capital interest in a co-operative concern. Some objection had been taken to the Act being made applicable to companies at present in existence and designated as "co-operative." If these had not been embraced in the Act the position would be that two classes of co-operative companies would have come into existence in Queensland—viz., companies formed under existing Acts and companies registered under the Act which had now been passed by Parliament. The former Acts make no provision for producers' co-operative movements, and there is no restriction whatever in respect to the use of the designation "co-operative." The new Act lays down well-defined and well-understood co-operative principles. The two sets of co-operative companies which would exist if those already formed had not been brought under the operation of the new Act would be found to be working along entirely different lines, with policies in conflict. In short, spurious co-operation would be in antagonism to *bonâ fide* co-operation, a state of affairs which on principles of right and justice it is not desirable should be tolerated. There was no shadow of doubt that primary producers do not desire such a state of affairs to obtain, and in their interests and at their request the Act was designed to bring the whole producers' co-operative movement into line. In doing so the Act imposes no measure of Government control, nor does it involve any repudiation of the decisions of producer shareholders. It confers upon each co-operative association complete local autonomy, with freedom from interference of any nature whatsoever so long as co-operative principles are maintained. Many of the provisions in the new legislation to which exception had been taken are not obligatory but optional—*i.e.*, certain rigorous provisions for co-ordination of the producers' interests are in the Act for them to use if they desire to use them, but there is no provision for the Government utilising these provisions to coerce the producers, an assertion which he emphatically contradicted.

It is true that clause 24 of the Act, in providing for the calling of a meeting of companies already in existence to determine whether or not they shall come under the new Act, lays down that the voting to determine this question shall be on the basis of one member one vote, but it is contended that the majority of individuals interested in the company should determine this important question and that it should not be determinable by vested interests. The financial interests of "dry" shareholders are not prejudiced by this clause, and, lest any instance arises wherein such prejudice may be deemed to accrue, the Act seeks to make the following generous provisions, viz.:—

(1) That the section shall not apply to any existing company exempted by the Governor in Council on the recommendation of the Council of Agriculture.

(2) That exemption be granted in respect to the use of the name "co-operative" by *bonâ fide* co-operative trading companies registered under the Industrial Provident Societies Act.

(3) Complete and generous provision for surrender of shares.

The Minister, therefore, unequivocally denies the allegation that the Bill involves repudiation, and takes very strong exception to the way in which certain interests apparently opposed to the primary producers have sought to misrepresent the measure and those who have been seeking to bring it into effect.

Gympie District Progress.

Following are the September statistics of produce and values supplied by the Gympie and District Progress Association:—

	£
Butter manufactured, 270,197 lb., for which suppliers were paid	21,129
Timber, 3,355,682 s. ft., valued at	28,355
Fruit, bananas, pineapples, and pawpaws	20,596
Cape gooseberries, 31,014 lb.	675
Agricultural produce	19,829
Pigs, 1,078, realised	4,022
Gold, 306 oz., valued at	1,040
Lime	137
Total value of products approximately	£95,783

Children and the Food Value of Milk.

From experiments carried out under the supervision of the medical officer of the Birmingham educational authority, a very instructive demonstration of the nutritive value of fresh milk has resulted. Thirty children of both sexes, aged from seven to eleven, selected from the scholars of a Council school, were given an additional daily ration of a pint of milk. After four months it was found by medical examination and ordinary observation that a rapid and notable improvement in physical and mental vigour, with an accelerated increase of weight, had occurred. The discontinuance of this addition to the children's dietary led within a month to a marked cessation of progress, a conclusive confirmation of the positive results of the four months' experiment. The value of pure fresh milk and the need for a much greater consumption in the country are constantly receiving such testimony. Milk supply, like housing, forms one of the most pressing social questions confronting the nation. Within the administrative functions of the Ministry of Health and Board of Education there is much scope for concerted action to secure the fullest possible use of this food so essential for the national wellbeing.—"The Dairy."

KILLING OF GREEN TREES WITH ARSENICAL POISON.

The trees to be killed with arsenical poison are first rung or "frilled;" by making downward cuts with the axe completely round the tree, each cut well overlapping the adjoining one, so as to leave absolutely no unsevered section of bark in which the sap could flow. The cuts must be made right through the bark into the wood proper and as close to the ground as possible, say from 6 to 12 inches up. The poison prepared as given below is poured into this frilling, right round the tree, using an old teapot or kettle, as the spout makes pouring easier and prevents wastage of solution. A large tree of 4 feet diameter may require about one quart of the solution, smaller trees proportionately less. Small saplings and suckers may be cut off level with the ground and thoroughly swabbed with the poison.

Trees may be killed by ringbarking or by frilling combined with poisoning at any time, but unless a suitable season is chosen suckering is likely to take place. From May to July is probably the best period of the year to carry out the work successfully. In the winter months the sap is assumed to be down, and therefore the end of autumn and during the winter the trees and undergrowth are more easily killed.

Preparing the Poison.—The arsenic may be dissolved with the aid of caustic soda or washing soda; when using the latter, boiling from half an hour to one hour is necessary before all the arsenic is dissolved.

Under ordinary circumstances 1 lb. of arsenic and 3 lb. of washing soda or 2 lb. caustic soda to 4 gallons of water is of sufficient strength to kill timber, but when it is a question of making doubly sure and killing more quickly in the case of vigorous saplings the solution can be used double strength.

The preparation and mixing is best done in an empty kerosene tin, which holds 4 gallons. When using caustic soda mix 1 lb. of arsenic and 2 lb. caustic soda thoroughly in the dry state and add gradually and carefully water.

Sufficient heat is generated to dissolve the whole of the arsenic; make up to 4 gallons, and finally stir in ½ lb. whiting, which latter indicates readily which trees have been treated. If washing soda is used mix 1 lb. of arsenic and 3 lb. of washing soda into a paste with some water, add about 2 gallons of water, and boil for half to one hour until all arsenic is dissolved; make up to 4 gallons, and add the whiting.

There is not much danger to stock grazing on areas treated by poison, and the leaves fallen from the poisoned trees would not contain any poison, but it is safer to keep the stock off such areas for some weeks, as they might lick some of the poison from the frills on account of the salty taste.

Answers to Correspondents.

Peanuts—Millet.

D.B.H. (Goodnight Scrub)—

(1) This depends entirely on the amount of natural food present. Under ordinary conditions, peanuts are troubled by bandicoots and kangaroo rats; wallabies will take to the same crop if the amount of their natural food is lacking, and will in most cases cause damage to broom millet.

(2) Where conditions are favourable it is possible to produce up to 1 ton per acre of peanuts, but 14 to 16 cwt. may be regarded as a good return. Values vary according to the demand, but 3d. to 4d. per lb. may be regarded as the average price.

Broom millet will give a yield, under favourable conditions, of from 14 to 18 cwt. per acre, the present value of this class of material being £35 to £40 per ton for prime hurl.

(3) Four to 5 lb. sown thinly in drills spaced 3 feet apart.

(4) Only one crop may be harvested from one planting of millet.

(5) Not advisable to use garden seed planters in scrub land unless your surface soil is absolutely free of all roots, otherwise breakages will constantly occur to machine, which is not intended for rough usage. The ordinary hand maize planter used on new scrub burns might suit your purpose. It all depends on what seed you want to sow; otherwise the ordinary planter's hoe would do. It usually takes about five years after falling for scrub roots to rot.

How to Make Tanglefoot.

Several inquiries having been received regarding the best way to make tanglefoot, the queries were referred to the Agricultural Chemist (Mr. J. C. Brünnich), and that officer recommends the following recipes:—

(1) Melt together 8 parts of resin, 4 parts of turpentine, 4 parts of rapeseed oil, and half a pint of honey.

(2) Boil to a thick paste 1 lb. of resin, 3½ oz. of linseed oil, and 3½ oz. of molasses.

(3) Carefully boil linseed oil until it becomes syrupy and tacky on cooling.

When using tanglefoot on the trunk of a tree to prevent insects from crawling up, it is advisable to smear the tanglefoot on a bandage of strong brown paper rather than on the trunk itself. Tanglefoot is recommended to prevent young orange bugs that have been shaken or otherwise driven from the tree on to the ground from again climbing up into the tree. It is also useful to prevent leaf-eating caterpillars, such as those that defoliate white cedars, from crawling up the trunk of the tree, as these caterpillars are night feeders —hiding during the day near the base of the tree and crawling up the trunk at night to feed on the leaves.

Orchard Notes for December.

THE COASTAL DISTRICTS.

The planting of pineapples and bananas can be continued, taking care that the ground is properly prepared and suckers carefully selected, as advised previously in these Notes. Keep the plantations well worked and free from weed of all kinds, especially if the season is dry. New plantations require constant attention, in order to give young plants every chance to get a good start; if checked when young they take a long time to pull up and the fruiting period is considerably retarded. Small areas well worked are more profitable than large areas indifferently looked after, as the fruit they produce is of very much better quality. This is a very important matter in the case of both of these fruits, as with the great increase in the area under crop there is not likely to be a profitable market for inferior fruit. Canners only want first-class pines of a size that will fill a can, and cannot utilise small or inferior fruit, except in very limited quantities, and even then at a very low price. Small, badly filled bananas are always hard to quit, and with a well-supplied market they become unsaleable. Pineapple-growers, especially those who have a quantity of the Ripley Queen variety, are warned that the sending of very immature fruit to the Southern markets is most unwise, as there is no surer way of spoiling the market for the main crop. Immature pineapples are not fit for human consumption, and should be condemned by the health authorities of the States to which they are sent.

Citrus orchards require constant attention; the land must be kept well worked and all weed growth destroyed. Spraying or cyaniding for scale insects should be carried out where necessary. Spraying with fungicides should be done where the trees show the need of it. A close lookout must be kept for the first indications of ''maori,'' and as soon as it is discovered the trees should either be dusted with dry sulphur or sprayed with the lime-sulphur, potassium, or sodium sulphide washes. Borer should be looked for and destroyed whenever seen.

Early grapes will be ready for cutting. Handle carefully, and get them on to the market in the best possible condition. A bunch with the bloom on and every berry perfect will always look and sell well, even on a full market, when crushed and ill-packed lines are hard to quit.

Peaches, plums, papaws, and melons will be in season during the month. See that they are properly handled. Look out for fruit fly in all early ripening stone fruit, and see that none is left to lie under the trees to rot and thus breed a big crop of flies to destroy the mango crop when it ripens.

Keep leaf-eating insects of all kinds in check by spraying the plants on which they feed with arsenate of lead.

Look out for Irish blight in potatoes and tomatoes, and mildew on melons and kindred plants. Use Bordeaux or Burgundy mixture for the former, and finely ground sulphur or a sulphide spray for the latter.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Early ripening apples, plums, apricots, peaches, and nectarines will be ready for marketing during the month. They are unsatisfactory lines to handle, as the old saw, ''Early ripe, early rotten,'' applies to all of them; in fact, the season of any particular variety is so short that it must be marketed and consumed as quickly as possible. All early ripening deciduous fruits are poor carriers and bad keepers, as their flesh is soft and watery, deficient in firmness and sugar, and cannot, therefore, be sent to any distant market. The available markets are quickly over-supplied with this class of fruit, and a glut takes place in consequence. Merchants frequently make the serious mistake of trying to hold such fruits, in the hope of the market improving, with the result that, instead of improving, the market frequently becomes more and more congested, and held-over lines have to be sent to the tip. There is only one way to deal with this class of fruit, and that is to clear the markets daily, no matter what the price, and get it distributed and into consumption as rapidly as possible by means of barrowmen and hawkers. Most early ripening fruits are useless

for preserving in any way, their only value being what they will bring for consumption whilst fresh. This being so, it is only a waste of time and money to forward immature, undersized, and inferior fruit to market, as it is not wanted, and there is no sale for it. It should never have been grown, as it is frequently only an expense to the producer, besides which, unless the fallen or over-ripe fruit is regularly and systematically gathered and destroyed in the orchard, it becomes a breeding ground for fruit fly and codling moth, as well as of fungi, such as those producing the brown and ripe rots. Early ripening fruits should, therefore, be carefully graded for size and quality, handled, and packed with great care, and nothing but choice fruit sent to market. If this is done, a good price will be secured, but if the whole crop—good, bad, and indifferent—is rushed on to the local markets, a serious congestion is bound to take place and large quantities will go to waste. It is better to get a good price for half the crop and destroy the balance than to rush the whole on to the market and get little or nothing for it.

Orchards and vineyards must be kept in a state of perfect tilth, especially if the weather is dry, so as to retain the moisture necessary for the development of the later ripening fruits. Where citrus fruits are grown, an irrigation should be given during the month if water is available for this purpose, excepting, of course, there is a good fall of rain sufficient to provide an ample supply of moisture.

Codlin moth and fruit fly must receive constant attention and be kept under control, otherwise the later-ripening fruits are likely to suffer severely from the depredations of these serious pests.

Grape vines must be carefully attended to and sprayed where necessary for black spot or downy mildew, or sulphured for oidium. Where brown rot makes its appearance, spraying with the potassium or sodium sulphide washes should be carried out. Leaf-eating insects of all kinds can be kept in check by spraying with arsenate of lead.

Vegetables will require constant attention in the Granite Belt area. Tomatoes and potatoes will require to be carefully watched in order to prevent loss from Irish blight, and no time should be lost in spraying these crops should this disease make its appearance in any part of the district, as it can be prevented by spraying with either Bordeaux or Burgundy mixture. These fungicides effectually protect the plants to which they are applied if used in time. If leaf-eating insects, such as beetles, grasshoppers, and caterpillars, are doing damage as well, add 3 or 4 lb. of arsenate of lead to the 100 gallons of spraying mixture used for the prevention of early and late blight (potato macrosporium and Irish blight), so that the one application will be effectual for both classes of diseases.

Keep all kinds of vegetables well worked, stirring the land frequently to retain moisture, and taking care to prevent the formation of a surface crust should rain take place. Remember that vegetables require plenty of moisture; therefore leave nothing to chance, but do your best to retain all the moisture in the soil you possibly can.

Farm and Garden Notes for December.

Although November is regarded generally as the best period for planting the main maize crop, on account of the tasselling period harmonising later on with the summer rains, December planting may be carried out in districts were early frosts are not prevalent, provided a known quick maturing variety of maize is sown.

To ensure a supply of late autumn and winter feed, dairymen are advised to make successive sowings of maize and sorghums, to be ultimately used either as green feed or in the form of silage. The necessity for such provision cannot be too strongly urged. Farmers who have not had any experience in building an ensilage stack can rest assured that, if they produce a crop for this purpose, information and instruction on the matter will be given on application to the Under Secretary for Agriculture and Stock; also that, whenever possible, the services of an instructor will be made available for carrying out a demonstration in ensilage-making for the benefit of the farmer concerned and his immediate neighbours.

In districts and localities where supplies of lucerne are not available, sowings of cowpeas should be made, particularly by dairymen, as the lack of protein-yielding foods for milch cows is a common cause of diminished milk supplies and of unthriftiness of animals in dairy herds. Cowpeas and lucerne can be depended upon to supply the deficiency. The former crop is hardy and drought-resistant. When plants are to be used as fodder, it is customary to commence to feed them to stock when the pods have formed. Animals are not fond of cowpeas in a fresh, green state, consequently the plants should be cut a day or two before use. Economy is effected by chaffing beforehand, but the plants can also be fed whole. Chaffed in the manner indicated, and fed in conjunction with green maize, or sorghum, when in head, in the proportion of one-third of the former to two-thirds of the latter, a well balanced ration is obtainable. Animals with access to grass land will consume from 40 to 50 lb. per head per day; a good increase in the milk flow is promoted by this succulent diet. The plant has other excellent attributes as a soil renovator. Pig-raisers will find it invaluable also.

A great variety of quick-growing catch crops, suitable for green fodder and ensilage purposes, may also be sown this month, notably Sudan grass, white panicum, giant panicum (liberty millet), Japanese millet, red and white French millet. Well prepared land, however, is required for crops of this description, which make their growth within a very limited period of time. French millet is particularly valuable as a birdseed crop, the white variety being more in favour for this purpose.

Successive sowings may be made of pumpkins, melons, and plants of this description.

In districts where onions are grown, these will now be ready for harvesting. If attention is given, in the case of garden plots, to bending over the tops of the onions, maturity of the crop is hastened. Evidence will be shown of the natural ripening-off process, and steps should be taken to lift the bulbs and to place them in windrows until the tops are dry enough to twist off. If a ready market is not available, and it is decided to hold over the onions for a time, special care should be taken in handling. Storage in racks in a cool barn is necessary, otherwise considerable deterioration is to be expected. Improved prices are to be looked for in marketing by grading and classifying produce of this description.

Cotton areas which were subjected to a thorough initial preparation, thereby conserving a sufficiency of moisture for the young plants, should now be making good headway where this season's patchy rain has fallen and sending their taproots well down. Keep down all weed growth by scarifying as long as the growth will admit of horse work.

KITCHEN GARDEN.—Gather cucumbers, melons, vegetable marrows, and French beans as soon as they are fit for use. Even if they are not required, still they should be gathered, otherwise the plants will leave off bearing. Seeds of all these may be sown for a succession. Tomatoes should be in full bearing, and the plants should be securely trained on trellises or stakes. Where there is an unlimited supply of water, and where shade can be provided, lettuce and other salad plants may still be sown. All vacant ground should be well manured and dug two spits deep. Manure and dig as the crops come off, and the land will be ready for use after the first shower.

FLOWER GARDEN.—Keep the surface of the land well stirred. Do not always stir to the same depth, otherwise you are liable to form a "hard pan," or caked surface beneath the loose soil. Alternate light with deep hoeings. A few annuals may still be planted, such as balsams, calendulas, cosmos, coreopsis, marigold, nasturtium, portulaca, zinnia, and cockscomb. Plant out whatever amaranthus may be ready. These may still be sown in boxes. Clear away all annuals which have done flowering. Bulbs should have all the dead leaves cut away, but the green leaves should not be touched. Stake chrysanthemums, and, as the flower buds develop, give them weak liquid manure. Coleus may now be planted and propagated from cuttings. Dahlias are in various stages, but the greater part will have been planted by this time. Give them liquid manure, and never let them dry up. Lift narcissus about the end of the year, but do not store them. Plant them out at once in their new positions. Top-dress all lawns.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF SEPTEMBER, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING SEPTEMBER, 1923 AND 1922, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Sept.	No. of Years' Records.	Sept., 1923.	Sept., 1922.
North Coast.	In.		In.	In.
Atherton	0·60	22	...	0·03
Cairns	1·69	41	0·05	0·44
Cardwell	1·45	51	0·33	0·10
Cooktown	0·58	47	...	0·17
Herberton	0·48	36	0·07	0·12
Ingham	1·29	31	0·04	1·75
Innisfail	3·65	42	0·78	2·13
Mossman	1·17	15	..	0·45
Townsville	0·79	52	0·03	0·22
Central Coast.				
Ayr	1·52	36	1·38	0·04
Bowen	0·83	52	...	0·25
Charters Towers ...	0·79	41	0·01	0·09
Mackay	1·63	52	...	1·58
Proserpine	2·29	20	0·05	0·30
St. Lawrence ...	1·33	52	...	0·73
South Coast.				
Biggenden	1·69	24	1·21	0·45
Bundaberg	1·77	40	1·80	0·52
Brisbane	2·08	72	1·21	3·35
Childers	1·95	28	1·21	0·45
Crohamhurst ...	2·71	30	1·45	3·28
Esk	2·32	36	0·85	2·20
Gayndah	1·57	52	0·50	0·72
Gympie	2·18	51	1·61	1·83
Glasshouse Mts. ...	2·33	15	1·73	2·93
Kilkivan	1·75	44	0·52	2·12
Maryborough ...	1·98	52	2·23	1·10
South Coast—continued:	In.		In.	In.
Nambour	2·55	27	1·14	3·08
Nanango	1·93	41	1·30	1·06
Rockhampton ...	1·35	52	0·45	0·57
Woodford	2·23	36	1·87	2·93
Darling Downs.				
Dalby	1·77	53	1·65	0·68
Emu Vale	1·92	27	1·36	1·35
Jimbour	1·60	35	1·44	0·60
Miles	1·46	38	1·48	0·56
Stanthorpe ...	2·46	50	1·54	1·62
Toowoomba ...	2·25	51	1·10	1·89
Warwick	1·90	58	1·20	1·84
Maranoa.				
Roma	1·55	49	1·81	0·04
State Farms, &c.				
Bungeworgorai ...	1·30	9	1·47	0·04
Gatton College ...	1·73	24	0·69	0·96
Gindie	1·04	24	2·74	0·52
Hermitage ...	1·71	17	1·00	1·66
Kairi	0·67	9	0·02	0·06
Sugar Experiment Station, Mackay	1·57	26	...	1·45
Warren	0·74	9	...	...

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for September this year, and for the same period of 1922, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Government Meteorologist..

ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1923.	October.		November.		December.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	5·34	5·50	5·4	6·8	4·51	6·31
2	5·33	5·50	5·3	6·9	4·51	6·32
3	5·32	5·51	5·2	6·10	4·51	6·33
4	5·31	5·51	5·1	6·11	4·50	6·34
5	5·30	5·52	5·0	6·12	4·50	6·35
6	5·29	5·52	5·0	6·13	4·50	6·36
7	5·28	5·53	4·59	6·13	4·50	6·36
8	5·27	5·53	4·59	6·14	4·50	6·37
9	5·25	5·54	4·58	6·14	4·51	6·37
10	5·24	5·54	4·57	6·15	4·51	6·38
11	5·23	5·55	4·57	6·16	4·51	6·39
12	5·22	5·55	4·56	6·17	4·52	6·39
13	5·21	5·56	4·56	6·18	4·52	6·40
14	5·20	5·56	4·55	6·18	4·52	6·40
15	5·19	5·57	4·55	6·19	4·53	6·41
16	5·17	5·58	4·54	6·20	4·53	6·41
17	5·16	5·58	4·54	6·20	4·53	6·42
18	5·15	5·59	4·53	6·21	4·54	6·42
19	5·14	6·0	4·53	6·22	4·54	6·43
20	5·13	6·1	4·52	6·23	4·55	6·43
21	5·12	6·1	4·52	6·24	4·55	6·44
22	5·11	6·2	4·52	6·25	4·56	6·45
23	5·10	6·3	4·52	6·25	4·56	6·45
24	5·9	6·3	4·52	6·26	4·57	6·46
25	5·9	6·4	4·51	6·27	4·57	6·46
26	5·8	6·4	4·51	6·28	4·58	6·47
27	5·7	6·5	4·51	6·28	4·58	6·47
28	5·7	6·5	4·51	6·29	4·59	6·48
29	5·6	6·6	4·51	6·30	5·0	6·48
30	5·6	6·7	4·51	6·31	5·0	6·49
31	5·5	6·7	...	...	5·1	6·49

PHASES OF THE MOON, OCCULTATIONS, &c.

3 Oct.	☽	Last Quarter	3 29 p.m.
10 ,,	●	New Moon	4 5 p.m.
17 ,,	☾	First Quarter	6 54 a.m.
25 ,,	○	Full Moon	4 26 a.m.

Perigee Oct. 11th at 1·42 p.m.
Apogee Oct. 26th at 12·36 p.m.

The moon will be apparently very close to the planet Mars on the 9th at 4·49 a.m., just before sunrise. About seven hours later the moon will be in conjunction with the planet Mercury. Shortly afterwards Venus and Saturn will be in conjunction at 3·47 p.m. On the 17th at 9 p.m. Saturn will be in conjunction with the sun.

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2 Nov.	☽	Last Quarter	6 49 a.m
9 ,,	●	New Moon	1 27 a.m.
15 ,,	☾	First Quarter	7 41 p.m.
23 ,,	○	Full Moon	10 58 p.m.

Perigee 9th Nov. at 1 a.m.
Apogee 22nd Nov. at 12·54 p.m.

Neptune will be in conjunction with the moon on the 3rd at 5·47 a.m. Venus and Jupiter will be in conjunction on the 5th at 6·11 a.m about 15 degrees east of the sun and setting about an hour later than it. Mercury will be in superior conjunction with the sun on the 16th at 10 a.m., passing it on the far side from west to east. It will be in conjunction with Jupiter on the 20th at 3·53 p.m.

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8 Dec.	●	New Moon	11 30 a.m.
15 ,,	☾	First Quarter	12 38 p m.
23 ,,	○	Full Moon	5 33 p.m.
31 ,,	☽	Last Quarter	7 7 a.m.

Perigee 7th Dec. at 1 p.m.
Apogee 19th Dec. at 9·12 p.m.

The planets Mars and Saturn will be in conjunction but apparently separated by three diameters of the moon on the 2nd at 5·42 p.m. Saturn will be in conjunction with the moon but more than three diameters above it at 9 a.m. on the 5th. About two and a-half hours later Mars will be in conjunction with the moon but a good deal further above it. Mercury will be at its farthest distance east of the sun on the 28th at 2 a.m., setting about an hour and a-half after it.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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QUEENSLAND AGRICULTURAL JOURNAL

VOL. XX. DECEMBER, 1923. PART 6.

Event and Comment.

The Current Issue.

The perennial interest of producers in our water supply problems is well served in this issue. In addition to further notes on irrigation in Queensland, are a short review of the first annual report of the Irrigation Commission, and a very useful article on the hydraulic ram. In the second instalment of a series of notes on pig-breeding the Berkshire is fully and informatively discussed. "Roundworms in Swine" is another contribution of interest to pig-raisers. An explanation of Regulations under the Pure Seeds and Stock Foods Act will be useful to both buyers and sellers. An epitome of a paper on the welfare of women in the tropics, read at the recent Medical Congress in Melbourne, is another good feature. The sugar industry is well covered by the usual series of notes—entomological and otherwise; and much other matter of interest to agriculturists generally is also included in the contents. Topical illustrations, numerous and well reproduced, are also a strong feature of the December issue, which readers are sure to appreciate.

Ex-Diggers' Success as Sugar Growers.

"What promises to become one of the finest pieces of work accomplished in land settlement in North Queensland is found at El Arish, a soldier settlement area some 20 miles from Innisfail. Here about eighty returned men have been settled in typical scrub country to clear the land and raise crops of sugar-cane. A particularly fine type of young manhood has been assembled, and for some years past they have been engaged in the preparation of the land, the erection of homes, and the planting and harvesting of cane crops," says "The Australasian" (8th December, 1923.) El Arish has every prospect of becoming one of the most prosperous settlements in our richly-endowed North, and it is interesting to note the attention the success of ex-A.I.F. men settled there is attracting in the South. Last year the Diggers on El Arish produced 6,000 tons of sugar-cane. This year's cut was somewhere near 17,000 tons, and based on the rate at which planting has been carried out it is not improbable that the total yield from this settlement next season will approximate 25,000 tons of cane. When it is remembered that the settlement is a little more than three years old and that the work of establishment had necessarily to march with the work of production, the achievement of the El Arish settlers is a remarkably fine one.

The Agricultural Position in Queensland.

The Annual Report of the Under Secretary for Agriculture and Stock (Mr. Ernest G. E. Scriven), just published, is a comprehensive review of the agricultural position in this State. The year has been one of great departmental extension and activity, the principal factors having been the larger knowledge obtained of the needs of rural life in Queensland through the deliberations of the Council of Agriculture and its subordinate organisations, and to the expansion of the cotton industry, which would have been much greater—probably double—had the season been normal. Absence of a sufficient rainfall in the summer months made the dry period of greater severity than that of 1902, because in that year summer rains fell, but this year the summer rainfall was very meagre. The pastoral industry has had to bear a twofold weight, because, in addition to the abnormal season, very low prices have ruled for stock, and our one-time prosperous export trade in meat received a severe check through the competition from North and South America on the European market. The difficulties of the industry in this respect have been so great that a Federal Council with a State Advisory Board has been formed, with the object of opening up new markets in Asia and other countries where it is expected that a profitable trade may be found.

The Federal Statistician has calculated that the Australian export of farm and dairy produce, in which latter honey exports are included, amounted in value in 1921-2 to the sum of £11,004,649, and that production of these commodities was of the value of £195,561,000, or about equal to £35 9s. 10d. per head of population, but in considering these figures it must be remembered that the Federal statistics are for the financial year, and that those for Queensland are for the year to 31st December in each case; consequently the figures given, though a good guide, are not quite correct so far as they relate to Queensland.

The number of owners engaged in cultivation, in comparison with the population, shows a slightly better proportion for 1922 than in the preceding four years; but the proportion has not yet reached 1917, when it was one owner to 3.29 per cent. of population. Cattle-owners in proportion to population have decreased in the different classes, as also have the sheepowners excepting among those owning from 1,001 to 5,000 head, in which class there is a small gain of 2 points per cent.

The Director of Agriculture (Mr. H. C. Quodling) commenting in his report upon the indifferent year from an agricultural point of view, makes a strong comparison in favour of a cotton crop as a great revenue producer in dry seasons, and mentions the natural ability of the cotton plant, not only to live, but to produce a crop, as being in marked contrast to the maize plant, which has suffered so severely in the Southern and Central districts. The moral of the experience is, therefore, that no farmer in the districts where cotton can be grown within a payable distance of a ginnery should make his arrangements for the year without including a field of cotton. The agricultural branch has been called upon during the year to give much time and help to other departments in matters which, although indirectly having a bearing upon agriculture, were not strictly departmental business.

Though the maize crop in the Southern and Central districts has not been good, the crop in the North has been generally satisfactory, and good yields are expected from the Atherton Tableland. The work of improving the quality of the maize grown here has continued despite the season, and thirty separate experiment plots were established, covering 120 acres. Some failed, others gave but a light return, but where conditions were favourable, heavy yields were obtained; upon the Imbil experiment plot, up to 50 bushels to the acre with Funk's 90-day, and in that district yields of 68, 75, and 90 bushels to the acre were secured from the Yellow Dent plots. At another plot Star Leaming returned 80 bushels to the acre.

Mr. Quodling again emphasises his oft-repeated advice for early and systematic preparation of land for cropping, particularly in relation to wheat. The seed wheat improvement scheme instituted by the Department and carried out with the help of the State Wheat Board was continued, and in face of a late planting and irregular seasons the results were fairly good, the returns from 523 acres giving an average yield of $22\frac{32}{60}$ bushels to the acre, the highest recorded being a return of 40 bushels to the acre in the Roma district from Roma Red wheat.

The demonstration plots in the Burnett and Callide districts, formed to help the land settlement scheme of the Lands Department, whereby intending settlers can actually see what the land will produce, have taken shape and crops have been planted. The work on these plots is entirely educational, and there is no intention of establishing permanent State farms; and as soon as the objects of the Lands Department have been attained the plots will be opened for selection, with protection for the improvements effected. In addition, there were fifty-six other experimental plots in the State for crops and for fertiliser experiments; but here again the season has been responsible for a very variable success. Instructional work in fodder conservation was vigorously carried out, and, though the advice and instruction were sympathetically received, there has been but little fodder for the farmers to save.

IRRIGATION IN QUEENSLAND—VI.

H. E. A. EKLUND, late Hydraulic Engineer, Queensland Water Supply Department.

The first of this series, a historical note, was published in the July Journal. Irrigation in the Lower Burdekin was reviewed in the August number, and the instalment in the following issue covered Irrigation in the West. In the October Journal practical considerations were discussed, and the last issue contained notes on Surface Supplies. The review will be continued through succeeding issues.—Ed.

DUTY OF WATER.

The term duty is usually understood as meaning an obligation, work, or service to be rendered—something to be fulfilled or performed. In some cases the actual volume used in an irrigating season is termed ''the duty,'' but to adhere to the meaning evidently intended by the word, the expression ''duty of water'' should signify the work that water *should* do in raising any particular crop. Many definitions of the expression are not happy, in that they endeavour to make the meaning too wide. The definition given by Sir Hanbury Brown, however, is both concise and clear—

> ''The duty is the measure of efficient irrigation work that water can perform, expressed in terms establishing the relation between the area of crop brought to maturity and the quantity of water used in its irrigation. The expression 'efficient irrigation work' implies that the water supplied to the crop is neither more nor less than what is best for it.''

Under this definition is is clearly immaterial whether soils vary in their powers to take up and retain moisture, as the ''duty'' will necessarily be an expression of this variation, and will, when once it is known for one crop, form a guide as to whether it will be high or low for any other crop, from the same kind of soil, in the locality under consideration. As yet there are no data available regarding the ''duty'' of water used in Queensland, because very few take the trouble to keep such records as are absolutely essential to make irrigation a complete success.

Where pumping is employed for obtaining the necessary water, the relationship above referred to is best expressed in terms of water required to mature 1 acre of crop. In gravity systems, where it is desired to know what area a known flow can irrigate, it is more convenient to have the term mean the area that continuous unit flow (1 cub. ft. per second, or 1 cusec) is capable of maturing.

In the former case the amount will be expressed as acre feet or acre inches, which is a definite quantity, the acre foot being an amount of water sufficient to cover 1 acre to a depth of 1 ft. The acre inch is similarly the amount of water necessary to cover 1 acre to a depth of 1 in., or, in round figures, 22,650 gallons. Table VII. is a comparative statement showing the number of gallons in from 1 to 12 acre inches.

The term ''duty'' as applied in gravity systems is particularly convenient, and it will be noted that 1 cusec flowing continuously for twenty-four hours is practically equal to 2 acre feet (1 acre = 43,560 sq. ft. and 1 cusec in twenty-four hours = $24 \times 60 \times 60$ cub. ft., or 86,400 cub. ft., or practically 2 acre feet).

The three principal factors which determine the duty for any particular crop are—

1. Character of soil.
2. Climate.
3. The ''Personal Equation.''

Character of Soil.

It is not only the physical character of the soil which has a direct bearing on the amount of water used. Equally, or perhaps rather more, important is the mechanical condition of the soil. One of the essentials, that soil be suitable for irrigation, is that this mechanical condition can be given to the soil by proper working.

But the mechanical condition desirable is not alone sufficient. Pure sand, whether wet or dry, is mechanically ideal for irrigation, but it is physically and

chemically and also practically unsuitable. Many stiff soils rich in clay may, under certain conditions, be made to yield a crop, but though such soils may have all the chemical constituents necessary for plant life, they may be physically and mechanically unsuitable for irrigation.

It is not sufficient for efficient irrigation to merely *produce* the correct mechanical condition. It is essential that throughout the growing of the crop this mechanically correct condition be maintained. This can only be done by properly working the soil, and as every application of water more or less tends to destroy this condition, cultivation is especially important and necessary after every application of water.

The character of the subsoil will also affect the duty. Where the subsoil is very porous, small (say 2-4 acre inches), and frequent, waterings will probably produce best results. If the subsoil is retentive there is a danger of waterlogging, and particular care is necessary not to use too much water. There is scarcely ever any danger of too little water being used, except where spray systems are employed. The character of the soil will also determine the irrigating head or the size of the stream that should be used. Where the soil is very porous and the subsoil also open and free, it is necessary to use a large head in order to get to the end of the furrow or plot and then shut off and go on to the next furrow, and so on. This cannot be done unless grading has been attended to, and the conclusion is naturally that though grading is necessary in all soils it is most necessary in porous soils. A little reflection will reveal also that heavy soils cannot be treated in this way, as if water were quickly run over practically no absorption would take place. The treatment for heavy soils is, therefore, in direct opposition to that for porous soils, and as the gradation of the soil varies so must the treatment vary. After a heavy soil has been covered with water very little absorption takes places, and it is therefore very necessary to see that the water does not cover over quickly. The best means to prevent this is to run a light plough or scarifier in the furrow just before applying the water, as long as the crop will permit this being done. Cultivation after irrigation is always essential, but on very light soils it may be found best not to cultivate immediately before irrigating. No definite rule can be laid down, but every irrigator is advised to make irrigation his hobby horse, the most essential thing being to record what has been done and watch the results.

Climate.

The climate has a great deal to do with the duty of water. If very hot and dry, a comparatively large volume is necessary to produce the desired result, and the duty is in such a case low. The seasons clearly have a similar effect, the duty in winter being higher than in summer.

The "Personal Equation."

The experience, knowledge, and ability of the irrigator himself have naturally a very marked effect on the duty. Where water is expensive, as in individual pumping plants, it would be of very great assistance to the irrigator to keep a careful check on the actual amount of water used. As a counter check the crop produced should also be carefully noted. Every farmer desirous of getting the best out of his land should measure all water that is used for raising the crop, whether it comes from the clouds or is obtained and applied by artificial means.

As an indication of the importance attached to the question of measuring, it might be mentioned that on all large irrigation areas neither trouble nor expense is spared to provide suitable and reliable meters. One such meter, known as the "Dethridge" and used on the Murrumbidgee Irrigation Area, is illustrated.

Measuring the Water.

Of the many and various means employed for measuring water, there is no better or more accurate method than the "weir" board. This cannot always be used, as the flow may vary and a continuous record of the volume passing the weir is, therefore, necessary. Though the weir itself is cheap, recording devices for use with weirs are expensive, and this form of measuring is therefore out of the question on large gravity schemes. But where the water required is obtained by pumping from individual plants the weir can be used to "rate" the pump. Once a pump has been properly rated the figures obtained are reliable, and as accurate as those obtained by many meters. There are very few irrigators in this State as yet making any endeavour to measure the water used, but those who do attempt it invariably have as their only guide the catalogued capacity of a pump.

FIG. 31.—THE "DETHRIDGE" METER.

FIG. 32.—OFFTAKE FROM THE LATERAL. (NOTE METERS.)

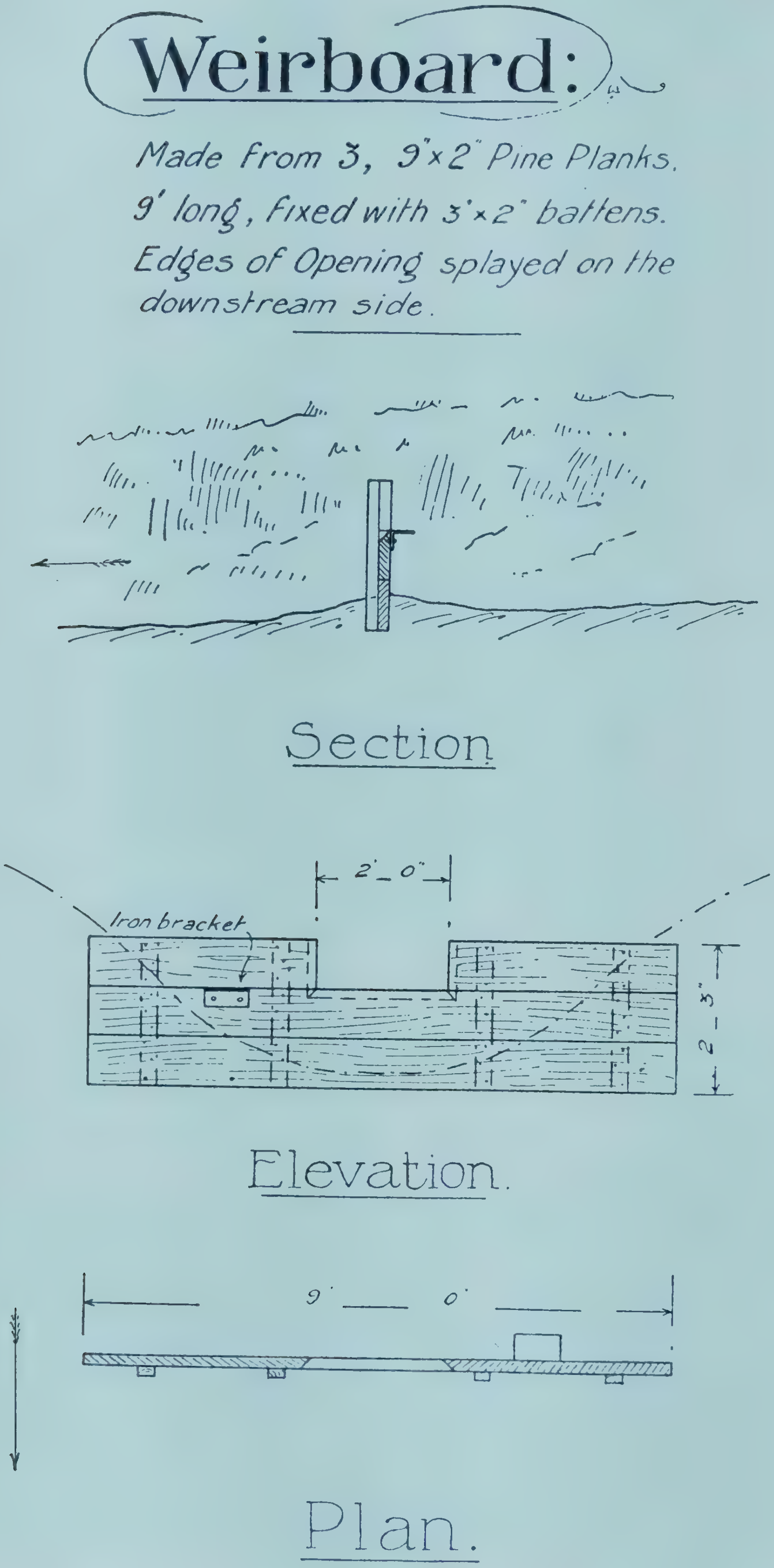
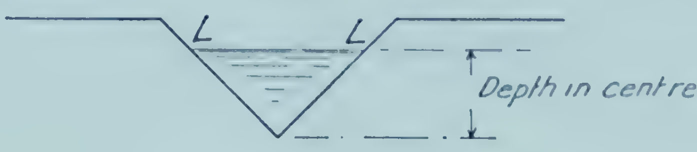

Weirboard:
Made from 3, 9"×2" Pine Planks.
9' long, fixed with 3"×2" battens.
Edges of Opening splayed on the downstream side.
Section
2'_0"
Iron bracket
2_3"
Elevation.
9'_0"
Plan.

Fig 33

Table IX.

Shewing discharge over a Right angle V notch Weirboard.

Measure width from L to L, then half this length equals the depth in centre of notch



Depth of Water in centre of notch	Gallons per Minute	Gallons per 24 hours	Depth of Water in centre of notch	Gallons per Minute	Gallons per 24 hours
1	1·9	2735	2 1/8	12 5	18,052
1/16	2·2	3190	3/16	13·5	19,420
1/8	2·6	3690	1/4	14 4	20.789
3/16	2·9	4239	5/16	15 5	22.307
1/4	3·3	4787	3/8	16 5	23825
5/16	3·7	5420	7/16	17 6	25452
3/8	4·2	6018	1/2	18 8	27,080
7/16	4·7	6770	9/16	20 0	28,837
1/2	5·2	7522	5/8	21·2	30,395
9/16	5 8	8342	11/16	22 6	32,530
5/8	6·4	9163	3/4	23 9	34,365
11/16	7 0	10120	13/16	25·3	36,448
3/4	7·7	11078	7/8	26 7	38.431
13/16	8·4	12104	15/16	28 2	40,551
7/8	9·1	13130	3	29 6	42,672
15/16	9·9	14292	1/2	43·6	62,776
2	10·7	15454	4	60 9	87,702

FIG. 34.

It has already been explained how the capacity of a pump will vary with a variation in speed and head, and to the man who wants to know what he is doing some check on the pump is necessary. In any case, before the capacity of a pump can be at all depended upon, it is necessary that it should be "rated" under the actual conditions of working.

The process of rating a pump, at least sufficiently close for all practical purposes, is a simple matter and one which any intelligent man can perform. The appliances are equally simple and have the distinct advantage that they are extremely inexpensive, merely comprising some boards, a few nails, a saw, and a 2-ft. rule.

Careful and extensive experiments carried out by various hydraulic engineers at different times have established a system of measuring water flowing over a notch made in a board. By carefully measuring the depth of overflow the volume can be calculated for practically any regular shape of notch, but for simplicity and uniformity three distinct shapes are usually adhered to. These are the rectangular, the trapezoidal, and the right-angled V notch. The forms recommended for use by irrigators are the rectangular and the V-notched weir-boards. Table VIII. gives discharges corresponding to depth of overflow for a notch 2 ft. wide, and Table IX. gives the volume flowing over a right-angled V notch, this latter being useful for small flows. Fig. 33 gives dimensions and particulars for constructing these weir-boards, and Fig. 34 shows how they are erected. It is necessary that the overfall be clear, and to get this effect the lip of the weirboard should be not less than 8 in. above the bottom of the drain, and a point on the drain should be selected where the water, after going over the weir, has a free "get-away." Care must be taken to set the weirboard level and plumb.

The orthodox method of measuring the water passing over the weir consists in correctly getting the depth of water over the lip of the weir. To do this, admit water to the weir until it is just level with bottom of notch, but not running over. Then drive a stake about 6 ft. up-stream and at the side, so that the top is just level with the water. It follows then that the top of the stake and the lip of the weir are just level. Then admit full flow to the weir and put the rule on the stake and refer to Table VIII. for gallons per minute, corresponding to the depth of water on the stake. The water just above the weir should be as still as possible, and for this reason a place in the drain should be selected where the grade changes from fairly flat to sufficiently steep to let the water away after passing the weir.

If the weirboard is made a good length, say long enough to have a clear 18 in. in water at either end of the notch, a ledge may be made at the side of the weir on the upstream side and level with the bottom of the notch. The rule can be placed on this and a reading thus taken. Though not so accurate as the above method, it is fairly close and will generally be found quite good enough for practical purposes.

In rating a pump, however, the former method should be used, and at the same time particular attention must be given to the speed. The suction head should be measured, as this is usually the head most subjected to variation, unless a system is used where the discharge head is intended to vary. In the latter case no pump which is not designed for a variable head should be permissible, and in such a case the only observation necessary as regards the pump is to make sure that it runs at the prescribed speed. If the pump is not designed for a variable head and such variation in head as does occur is due to unforeseen causes, the speed rules given will be found useful for getting the pump to deliver its maximum capacity. Table X. gives various sizes of pumps with capacity, horse-power required, and the speeds between which their best capacity should lie; also indicating the efficiency that should be obtained.

LAYING OUT THE LAND AND HEAD DITCHES.

"You may dream and scheme and connive and contrive, but you will never find an effective substitute for hard, honest work."

Laying Out the Land.

Irrigation subsequent to settlement is uphill work for the designer. He feels that the land surveyor's object in life is merely to get a pretty-looking plan. The fact that a farmer or settler is expected to make a living on the area after it has been surveyed seems but a secondary, or third, or fourth consideration. The common-sense way is, of course, to lay it out on topographical lines.

To make the best of a bad job the first thing to do is to properly contour the area to be irrigated. Whether the system is gravity or pumping, or whether the irrigation is by flooding or furrow, head ditches are necessary. To correctly locate

these requires skill and care. From these head ditches distribution of the water should be across the contours, provided the grade is not too steep. The fall given or allowed to the ditches will depend on the class of soil.

Head Ditches.

The farmer who can put in head ditches made of concrete will save expense in the long run. Not only will he be free from an accumulation of weeds that have to be cleaned out every time the ditches are wanted, but he will also prevent seepage if the water is obtained by pumping. Saving of water means saving in power and better economy all round. Thrifty John Chinaman carries the water to just that plant that needs it. By doing so he not only saves water, which, wasted in seepage and evaporation, gives no return, but saves labour in not having to subsequently clean out superfluous growth. Concrete is certainly expensive, but the thrifty farmer will do a little every year until he has completed his system. Having a head ditch made of concrete, a good head of water, and his land properly graded, one man can water over 5 acres a day where the furrow system is in use.

The distinct advantage of concrete channels lies in the fact that the grade is only a secondary consideration. Where the grade obtainable is too low for an earthen channel, concrete is better because of the greater velocity due to less friction. In cases where the grade of an earthen channel would be too great because of probable erosion, the concrete channel does not suffer from this drawback. In all cases the sectional area of a concrete channel is less than that of the earthen ditch conveying the same amount of water.

Where concrete channels are built, these should be so constructed that the bottom of the opening in the side is level with the surface drain taking the water to furrow or plot.

The most convenient kind for the farmer to build is the rectangular section, and though the semicircular has advantages, these are hardly sufficient to offset the greater difficulty of constructing it.

Ready-made semicircular concrete ditches in sections are on the market at a reasonable price, but unless made close to or on the irrigation area, the cost of transit makes this type too expensive for general use.

Ordinary earth ditches have successfully been sprayed with cement by means of the "cement gun," and so made to act as a concrete ditch. Recent Californian practice seems to favour this kind of ditch, and it is claimed that it is nearly as durable and quite as efficient as the ordinary concrete ditch.

Where funds do not run to concrete ditches, it is well to remember that the ground on either side of the earth-ditch is a breeding-ground for weeds. These should be cleaned away before irrigating, or the seeds, falling into the water, will be distributed over the cultivated area.

After having decided upon the location of the head ditches, the next thing to determine is the size of the ditches. The size is governed by two factors—the quantity of water to be carried and the grade of the ditch. The more water a ditch has to carry the larger it must be. The greater the grade the smaller the ditch required to carry the same quantity of water; but the grade must not be too great or erosion will take place. The eroded earth will be carried along by the water to some place where the velocity is less and there deposited. This may occur to such an extent that the ditch fills up and causes the water to break out in some places, whilst making the ditch too deep somewhere else. Hence it is necessary to avoid sudden changes in grade. The more even the grade the less the trouble in maintaining the ditch.

Though it is essential to avoid too great a grade and too high a velocity, it is equally necessary to have the grade so that the velocity is not too small. The evils of a low velocity are—too much seepage, too rapid a growth of weeds, and a disproportionate loss by evaporation. The mean velocity to be aimed at in small earthen channels is in the neighbourhood of 1.5 ft. per second.* Circumstances naturally limit this, and it sometimes becomes necessary to choose between two evils. When this necessity arises, it is well to remember that the greater velocity is better than the less. Too great a velocity can be handled and coped with by putting in checks or drops, but to remedy a velocity that has proved too low is an expensive undertaking.

Table X., showing the grade or fall of the ditch, with resultant velocity of stream and quantity of water flowing, should be useful. It will be found that the same

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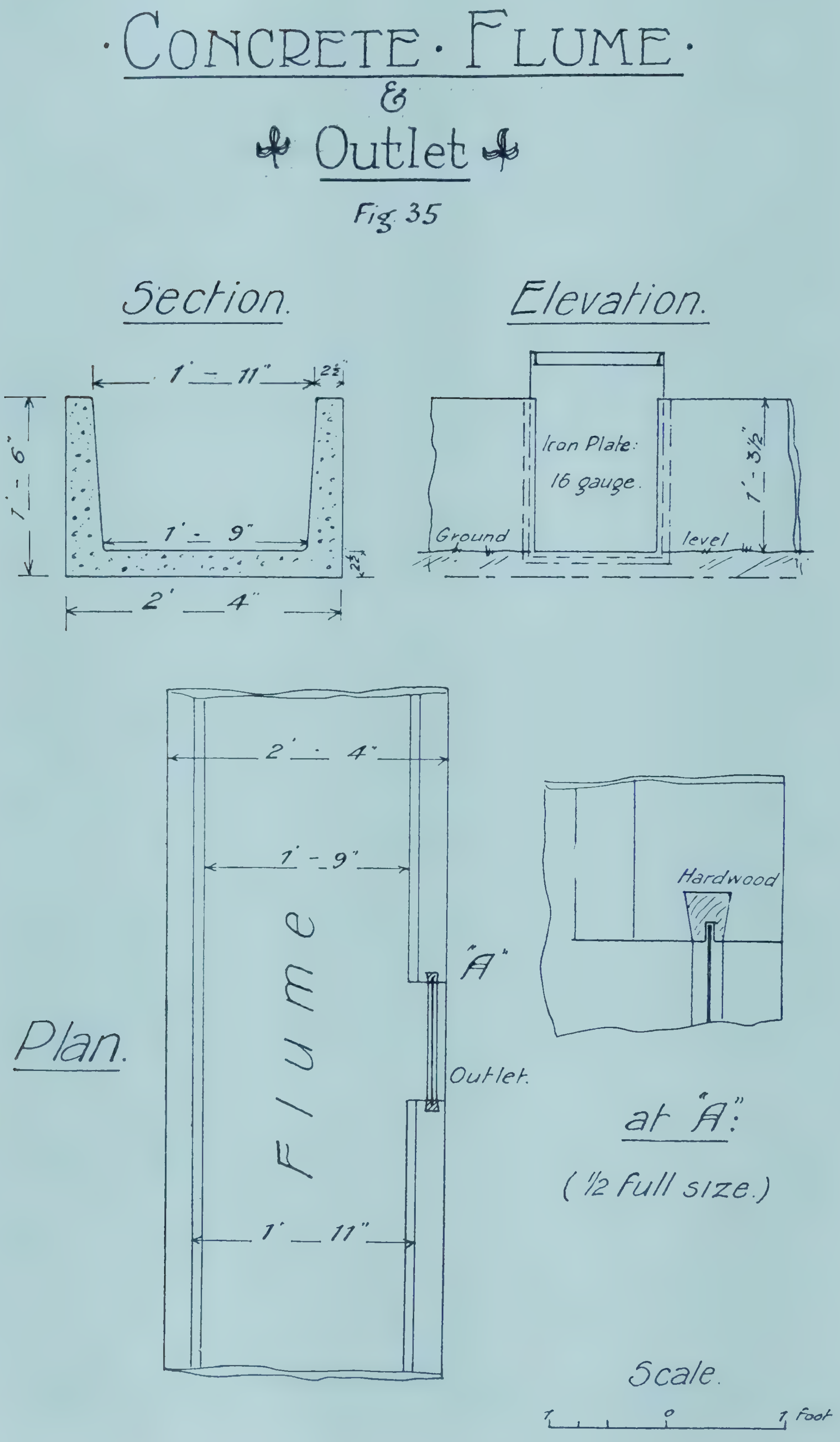
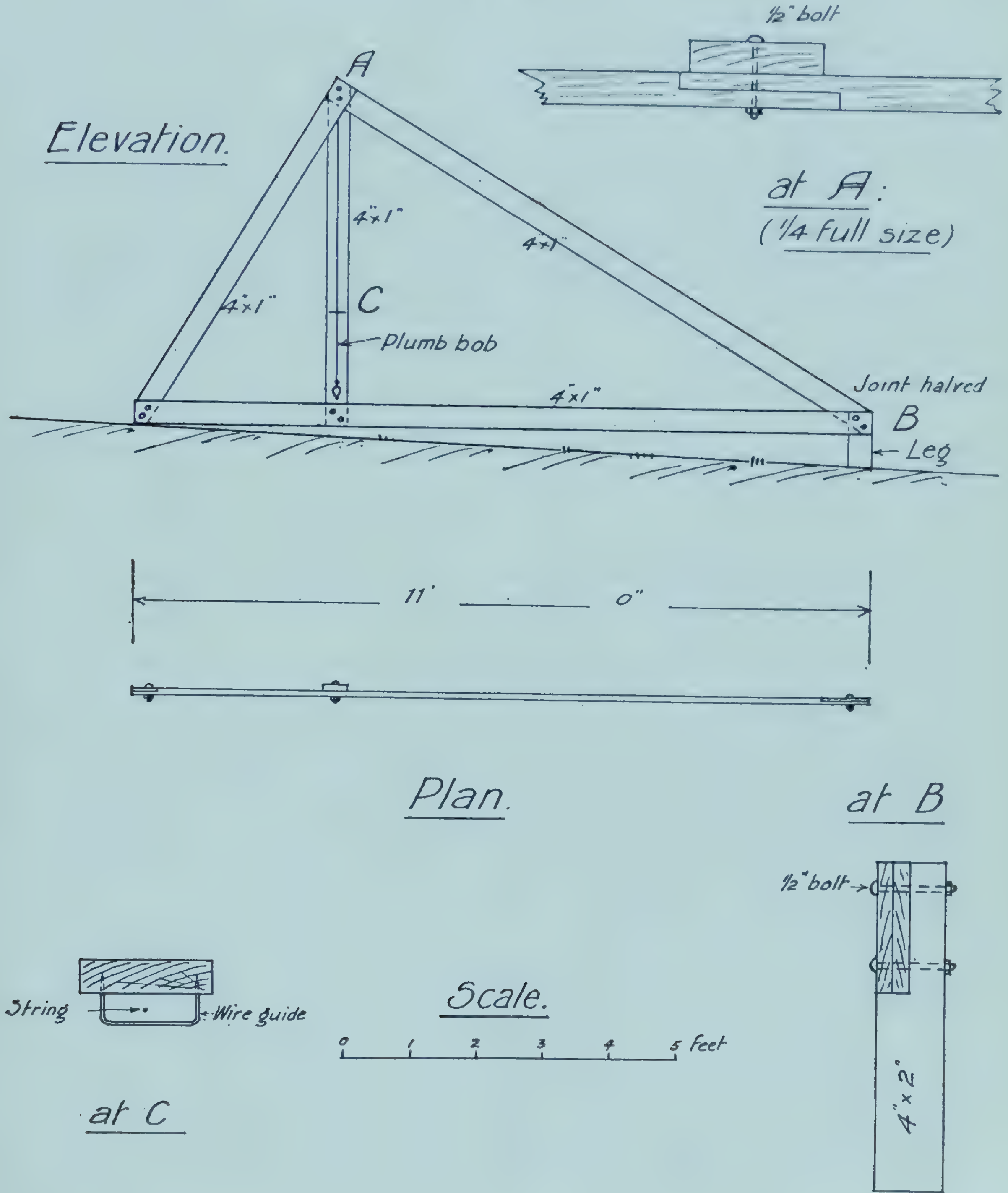
*Merriman recommends a mean velocity of 1.8 ft. per second. A velocity of 2.3 ft. will be found to keep weeds from becoming established, though this only applied to canals carrying supplies perennially.


·CONCRETE·FLUME·
&
Outlet
Fig. 35
Section.
1' - 11"
2½"
1' - 6"
1' - 9"
2½"
2' 4"
Elevation.
Iron Plate:
16 gauge.
1' - 3½"
Ground
level
Plan.
2' - 4"
1' - 9"
Flume
"A"
Outlet.
1' 11"
Hardwood
at "A":
(½ full size.)
Scale.
1
0
1 foot

SKETCH OF Grading Triangle.

Fig 36



quantity of water is carried by ditches which differ in size when the grade is different. The velocity of water in any ditch will also depend on the smoothness of the surface of bottom and banks. If rough and lumpy or overgrown with grass, the velocity and therefore the quantity flowing will be considerably reduced. The tables have been calculated for clean drains reasonably free from lumps and irregularities.

When the amount of water likely to be wanted has been ascertained and the grades available for head ditches are known, the farmer can, by use of these tables, determine the size of ditch most suitable for his needs.

To prevent erosion of ditches the grade chosen must be such as to keep the velocity of the water within safe limits for the class of soil through which the ditch passes.

Safe limits of velocity through various classes of soil determined by experiments, and which may be used as a guide, are given by many authorities, and the approximate mean results appear to be:—

In light sandy soil rich in humus the velocity should be about ..	¼ ft. per second, or 0.17 m. per hour.
In light clay soil the velocity should be about	½ ft. per second, or 0.34 m. per hour.
In coarser open sandy soil the velocity should be about	⅔ ft. per second, or 0.45 m. per hour.
In gravelly soil the velocity should be about	1 ft. per second, or 0.68 m. per hour.
In coarse gravelly soils	2 ft. per second, or 1.36 m. per hour.

It is not advisable to adopt a velocity much greater than this anywhere, as a stream having a velocity of between 2 and 3 miles per hour is capable of moving stones the size of an egg, while a stream with a velocity of over 3 miles per hour will erode soft schist.

For safe mean velocity of water in ditches in feet per second, "Kent" gives:—

Material of channel.	Feet per second.
Soft brown earth	0.3
Soft loam	0.6
Pure sand	1.1
Gravel	2.6
Sandy soil, 15 per cent. clay	1.2
Sandy soil, 40 per cent. clay	1.8
Loamy soil, 65 per cent. clay	3.0
Clay loam, 80 per cent. to 85 per cent. clay	4.8
Agricultural clay, 95 per cent. clay	6.2
Clay	7.2

The orthodox method for laying out the line for ditch or drain is by means of dumpy level and staff. It is not every farmer who can use the level, nor would his requirements in that direction warrant the outlay necessary to obtain an instrument. There are many simple contrivances which, in the hands of an intelligent and careful man, can be made to give good results sufficiently accurate for ordinary purposes. One such, also useful when checking the evenness of depth of an already surveyed and constructed drain, is the "triangle." It appears to be much favoured by the American irrigationists and is fully described in the "United States Agricultural Bulletin," No. 158, by Johnstone and Stannard. (*See* Fig. 36.)

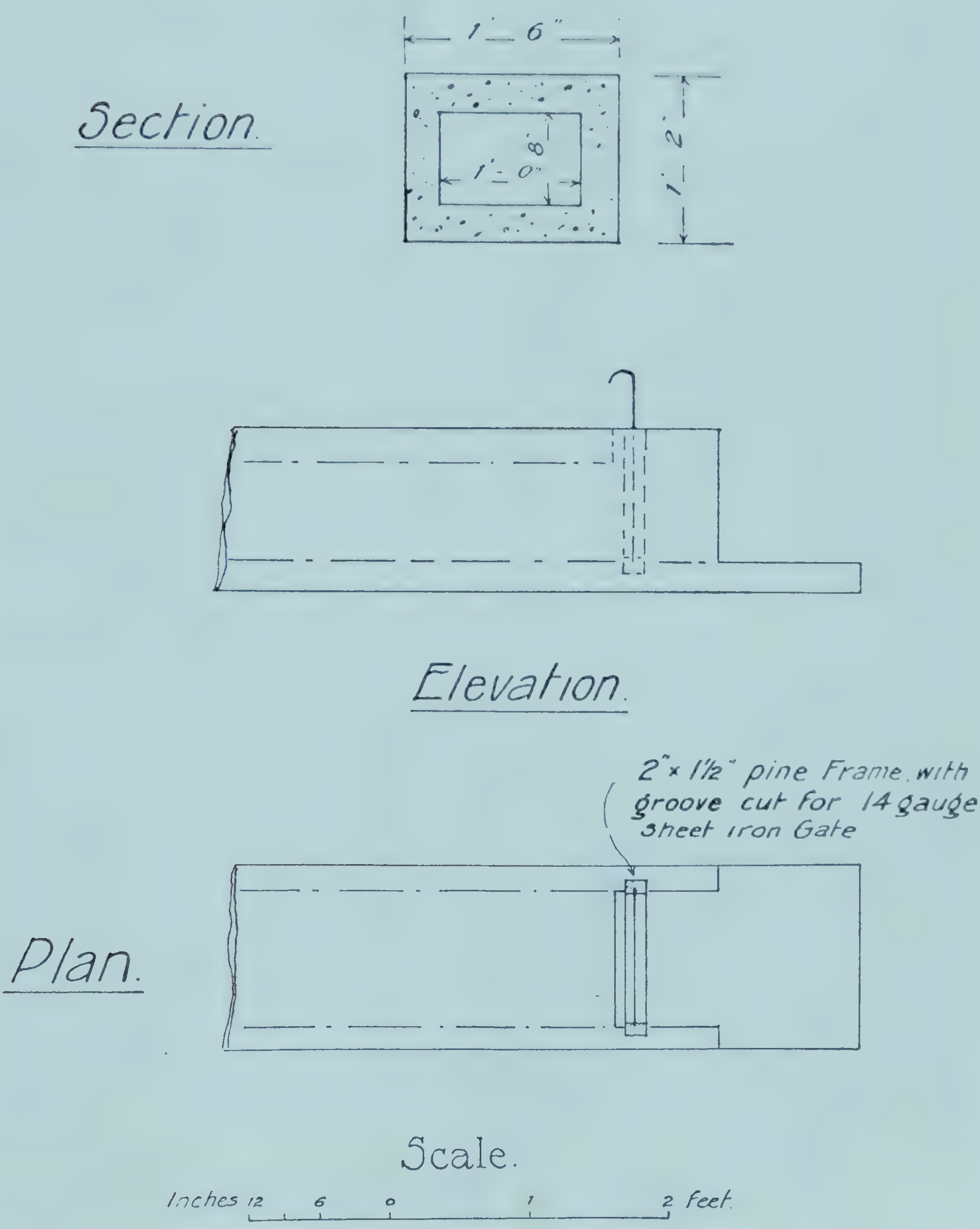
The length of the base line is 11 feet. It will be noted that 66, which is the number of feet in a chain, and 5,280, the number of feet in a mile, are both even multiples of 11. The table showing grades per chain and mile will be found convenient for use with the triangle.

Assuming that it is desired to run or check a line having a grade of 6 inches per chain, proceed thus:—Divide 66 by 11 = 6. This is the number of times that the triangle must be applied end to end to cover the distance 66 feet or one chain. Divide the grade by the number of applications for the distance, whether chain or mile; in this case: 6 inches ÷ 6 = 1 inch, which is the length of the leg projecting below the base at one end of the triangle. If the calculation is made according to the grade per mile divide 5,280 by 11 = 480. If the grade is to be 10 feet per mile

·Concrete·Sluice·Box·

(Can also be made of Concrete Slabs, in which case joints should be dowelled and grouted.)

Fig. 37



divide 10×12 by $480 = \frac{1}{4}$ in., the length of the leg in this case. The triangle will be found particularly useful in checking the evenness of grade, as any two points 11 feet apart must show the same difference in level if the grade is uniform. (*See* Table XII.)

The head ditch made for the purposes of irrigation necessarily differs considerably in cross section from the distributing drain for a stock watering supply. In the latter case the object aimed at is to keep the flowing water level *below* the natural surface. Head ditches for irrigation are made to keep the flowing water level well *above* the natural surface to permit the ditch being tapped where required. The earth taken out of the ditch will, therefore, in most cases be found insufficient to make the banks of the required height and thickness. The deficiency should be made up by earth taken from as large an area as possible to prevent hollows.

The outlets from the ditches to the irrigated plots are called "sluice boxes." These may be made of wood or concrete, but concrete is preferable on account of its greater durability. If white ants can be kept in check by poisoning, wood may be used for a season or two on account of cheapness and ease in construction, but these wood boxes should be replaced by concrete as soon as possible. The essential thing about the sluice box is that the opening can be regulated. Two designs of sluice boxes are shown in Figs. 37 and 38, the former being made of concrete, the latter of wood. The boxes may be made wherever most convenient, but it is essential that they be well rammed when put into the bank, so that no water leaks past them. The length of the box depends on the thickness of the bank, and other dimensions may be varied to suit each case. Table XIII. shows volume of water passing through with various openings of the gate for the sizes given.

Grading the Land.

When the position of head ditches has been decided upon, the preparation of the land can commence with the definite object in view that the fall is to be kept as even as possible. In ploughing, harrowing, cross-ploughing, &c., a good deal can be accomplished by good judgment, so rendering the final operation of grading less laborious. As a matter of fact, all operations from first ploughing to final grading are pure judgment based on the result of the contour survey. Some men will learn to grade quickly and effectively with almost any implement; others may never become expert, though perseverance is a good quality to possess even here, and seeing an expert doing the work a few times is better than trying to find out.

"The gospel of the plough" is not necessarily deep ploughing. The latter *can* be overdone; though considering the depth of our Queensland soils it is not likely to be carried to excess. But it is always advisable to subsoil, and judicious subsoiling is a very necessary adjunct to irrigation. By "subsoiling" is meant the stirring and opening up of the subsoil. It is distinctly *not* advisable to bring the subsoil to the top, especially if it contains a large percentage of clay.

When the soil has been ploughed to a depth of, say, 9 to 10 inches and reduced to a fairly fine tilth, grading can commence in earnest. Most of the implements used for grading are American in origin, or adaptions to suit Australian conditions.

If the ground is rather uneven and "knobby" the first implement to be used is the "buck-scraper." This is purely an earth-scoop, so made that filling and emptying are easily effected without stopping the pulling team.

The implement can be obtained from Australian makers in two- or four-horse sizes, the larger size being worked by two men. In Fig. 39 this is shown in the act of filling, and Fig. 40 shows the position when just on the point of discharging its load. Unlike the ordinary earth-scoop, the load, when in the act of being dropped, can be distributed over a considerable distance. The buck scraper may be likened to a jack plane taking off the rough. The buck scrapers used at Yanco, on the Murrumbidgee Irrigation Areas, are made by the Golden City Implement Company, of Bendigo. The implement is thus described by Mr. Quodling, the officer in charge of this work on the Area: "It is of particular utility on uneven land—*i.e.*, land having small hills and hollows, the preliminary treatment of which necessitates scraping off hillocks for material to fill the hollows near by, and thereby roughly covering up the surface. It does not lend itself to the imparting of a neat finish to grading, being invariably followed by the Byrne smoother, or one or other of the louvre graders as a finisher. The implement is often used for moving earth through a distance of several chains, which in being dumped is roughly spread and smoothed by causing the implement to be drawn over the dumped material when held almost vertically on its cutting edge, the angle at which it stands being controlled by the operator by means of a short length of rope attached to the top of the handle or lever."

Necessarily land must be ploughed, unless it is almost a pure sand, and worked down to a fairly fine surface before the buck scraper or any other grading implement can be used to advantage.

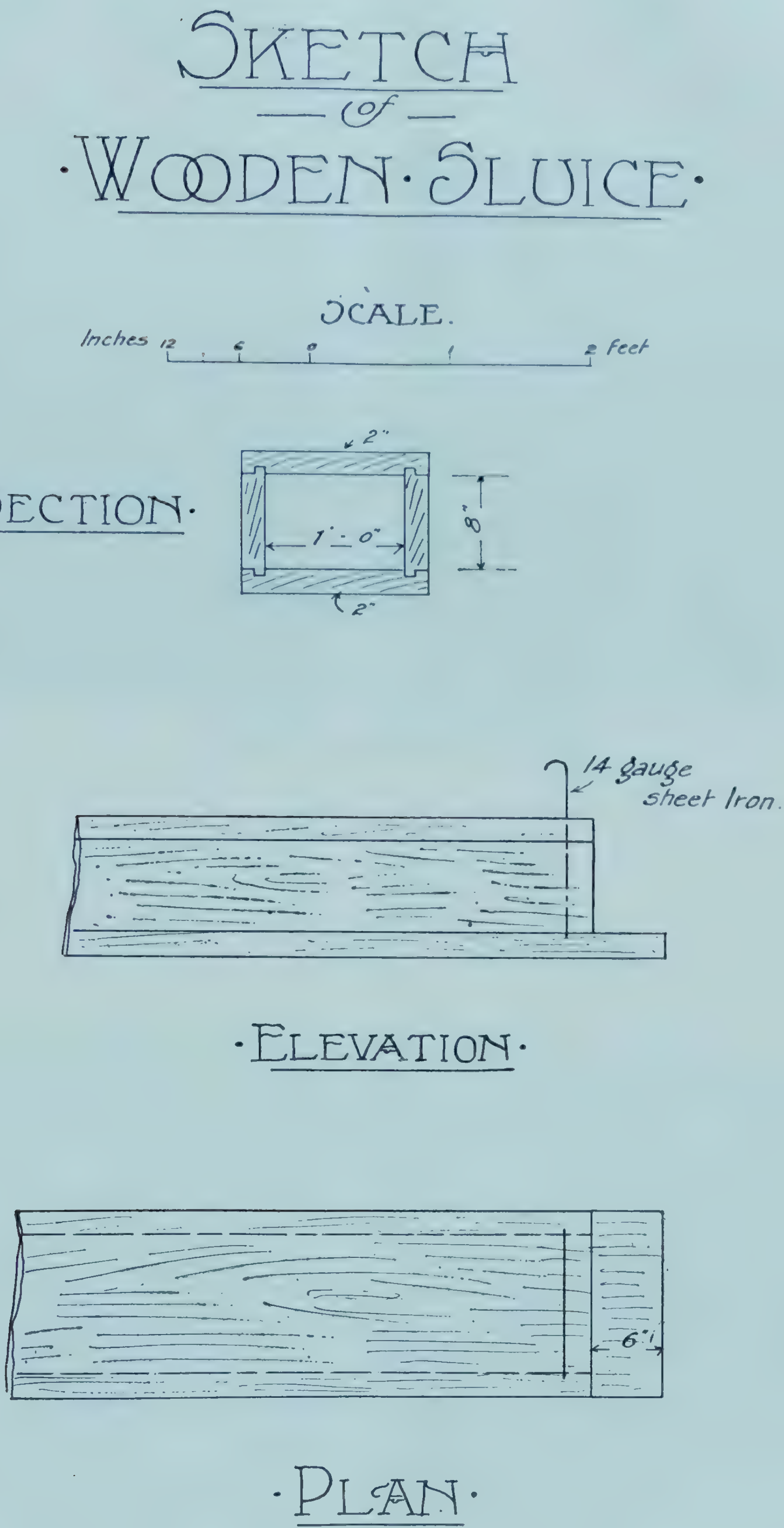

SKETCH of WOODEN SLUICE
SCALE.
Inches 12 6 0 1 2 Feet
SECTION
2"
1' - 0"
8"
2"
14 gauge sheet Iron.
ELEVATION
6"
PLAN

Fig. 38

FIG. 39.—BUCK SCRAPER (FILLING).

FIG. 40.—BUCK SCRAPER (DISCHARGING).

Fig. 41.—The Horne Grader.

Fig. 42.—The Pavey Grader.

There are several kinds of smoothers in use for following up the buck scraper. These are nearly all more or less automatic in action and one of the favourities appears to be the Horne Grader, shown in Fig. 41. On account of the length of this implement the automatic action is very distinct. The louvres or cross pieces are movable, and any earth carried can be discharged where desired; but it is clear that whether the discharge device is operated or not it will ''pick up'' on prominences and drop the load in hollows.

The Pavey Grader, shown in Fig. 42, is made by Pavey, Merrigum, Victoria, and is thus described by Mr. Quodling:—

''This implement has an inner frame working inside another which is capable of being raised or lowered by a lever so as to regulate the ''bite,'' and so as to dump material into depressions, which is then smoothed off by the rear louvre. It is a very—perhaps the most—useful grading implement, and in the hands of a skilled man can turn out well-finished work. Having only two louvres as compared with three, four, or five (depending on the size of the implement) which the Byrne grader is provided with, it does not span the length the latter does, and therefore more closely follows undulations of the surface and does not reduce the land to as true a plane surface.

Byrne Grader (Fig. 43) made by Golden City Implement Company, Bendigo, and the *Horne Grader* (Fig. 41) made by Horne, Tatura, Victoria, are used in a similar fashion to the Pavey Grader, but both possess an advantage over the Pavey when it comes to imparting a good finish to the work.

The Horne Grader is, roughly speaking, similar to the Byrne, but having a longer level operated by a man standing, whose view is less restricted than when operating from a sitting position, as is the case with the short lever of the Byrne Grader. The Horne is perhaps a little better than the latter.

The Delver (made by the Golden City Implement Company), is a V-shaped implement for forming ditches by crowding earth from a narrow strip of ploughed ground equally on each side of the axis of the strips so as to form banks. It is an efficient implement for constructing ditches, having a finished width between tops of batters up to 9 or 10 feet and a depth below natural surface up to 15 inches. Where ditches are carried across depressions and the embankment is formed in advance to the proper grades, it can be used to full advantage.

The Byrne Smoother (Golden City Implement Company), shown in Fig. 44, besides being used as its name implies, is largely used also for putting up low levees or check banks for the purpose of irrigating by flooding, in definite courses. When so used it is operated by one man driving a four-horse team across the direction of irrigation, a thin layer of the surface soil being scraped off and gathered for dumping on the line of the levee. The dumping is effected by the transference of the driver's weight backwards on the platform on which he stands, which causes the implement to tilt and release the gathered material. The driver then steps a little forward and causes the rear end to rise and clear the bank, and at the same time to shape it. The team must be kept moving and the number of sections of levees that may be formed by one stroke of the implement is limited only by the size of the field. On reversing the team the banks are extended again by the width of the implement, and so on, until completed. As only low banks are usually required in this connection, sufficient material is gathered by one stroke of the machine; but the banks may be strengthened by reversing the team and returning along the same track. Irregularities of the surface are smoothed out in the process thus described, but it is necessary to finish the grading by drawing the implement parallel with the banks or, better still (since it, like the Pavey Grader, has only a short base and thus closely follows the undulations) to finish with one or other of the louvre graders.

Another use this implement may be put to is that of crowding earth from the high to the low side of the narrow bank bounded by the check banks, one draft chain being shortened to enable the implement to be set at the required angle on the same principle as an ordinary road grader.

The implements described above are all good, but users naturally have their own fancies and for some reason prefer one type to others. Each tool, however, requires a certain amount of practice before the user can become expert, and no one should be discouraged or blame the implement if not immediately successful.

After grading has been accomplished to the farmer's satisfaction, the land is again thoroughly and deeply ploughed and harrowed and well subsoiled, and it is best to then again run over it with a home-made ''smoother'' if the land is to be sown with seeds. If the furrow system is intended and larger plants, such as maize, sugar-cane, or vines are to be grown, the smoothing may be dispensed with, though the ploughing and harrowing are necessary.

[*In the next issue Systems of Irrigation will be discussed.*]

Fig. 43.—The Byrne Grader.

Fig. 44.—The Byrne Smoother.

THE HYDRAULIC RAM.*

By DR. W. S. H. CLEGHORNE, A.M.I. Mech. E., Lecturer in Engineering, School of Agriculture, Potchefstroom.

Given suitable conditions, the hydraulic ram is an excellent machine for raising water, and it is probably only because it is so little known to farmers that it is not in more general use for farm water-supply.

Conditions Necessary for Successful Operation.

The hydraulic ram utilises the momentum of a stream of water, falling through a small height, to raise a *portion* of that water to a greater height. Thus, the two essentials to the successful operation of the ram are (1) a running stream of water with (2) a sufficient fall.

The stream need not be large; if there is a good working fall a flow of as little as 1½ gallon per minute is sufficient to operate a ram for small supplies. In fact, if an arrangement such as that shown in Fig. 2 is employed, a still smaller stream will operate a small ram at intervals, with periods of rest between. Fig. 2 is described later on.

A working fall as low as 18 inches will do to work a ram, but a minimum fall of 3 feet is preferable. The greater the working fall that can be obtained (up to about one-fifth the height the water is to be raised above the ram), the less the ram will cost and the less driving water will it require to lift a given quantity through a given height.

The installation of the ram will be cheapened if just above where the ram is to be installed the bed of the stream is fairly steep—*i.e.*, if the necessary fall occurs in only a short distance along the course of the stream.

The distance to which the ram delivers (*i.e.*, the length of the delivery pipe) may be very great; rams are in operation delivering over distances up to 2 or 3 miles.

Principles of Action.

Referring to Fig. 1, the essential parts of a hydraulic ram are:—

(1) A straight drive-pipe leading the water from the feed or supply tank (which is replenished from the stream above the fall) to the ram.

(2) An escape or impetus valve.

(3) An air-vessel.

(4) A discharge or delivery pipe, of smaller diameter than the drive-pipe, leading to the elevated storage tank.

(5) A check or non-return valve at the entrance to the air-vessel.

While the valve V is closed, the impetus valve remains open, due to its own weight (or sometimes to the action of a spring). When the valve V is opened the drive-pipe fills, and water begins to escape past the impetus valve; the water in the drive-pipe meanwhile gains velocity and momentum. This goes on till the velocity of the escaping water becomes sufficient to close the impetus valve. The water being no longer able to escape through the impetus valve, is then carried by its momentum past the check valve into the air-vessel, and finally up the delivery pipe into the storage tank.

This continues till the momentum is destroyed, when there is a slight recoil of the water, the check valve closes, the impetus valve again opens automatically, and the cycle of operations is repeated.

During the recoil of the water, a little air is drawn in through the pinhole P or through a small valve opening inwards only and called a snifting valve, and replenishes the air-vessel, thus preventing it from becoming water-logged.

Capacity and Efficiency of Rams.

If a ram were perfect in all respects—*i.e.*, if its efficiency were 100 per cent.—the full amount of work done by the falling water would be returned in lifting a portion of that water to a higher elevation. The fall being taken as the vertical distance between the water-level in the feed-tank and the impetus valve (h in Fig. 1)

* Jour. Dept. Ag. S. Africa, vol. vii., No. 4, Oct., 1923.

and the lift as the vertical distance between the impetus valve and the upper end of the delivery pipe (h_1 in Fig. 1) then, theoretically:—

TABLE I.

$\frac{1}{3}$ of the water supplied to the drive-pipe will be raised through a lift					3 times as great as the fall.		
$\frac{1}{5}$	"	"	"	"	5	"	"
$\frac{1}{8}$	"	"	"	"	8	"	"
$\frac{1}{10}$	"	"	"	"	10	"	"
$\frac{1}{15}$	"	"	"	"	15	"	"
$\frac{1}{20}$	"	"	"	"	20	"	"

Since, however, no ram is perfectly efficient, the theoretical figures in the first column are reduced in practice.

The efficiency of a hydraulic ram may be defined as the fraction or percentage of the natural effect that is usefully employed in forcing water up the delivery pipe. The greater the fall is in proportion to the lift, the higher is the efficiency, but in practice it is seldom advisable to have the fall greater than one fifth of the lift. With a high fall the strains set up are excessive, and the ram wears out quickly.

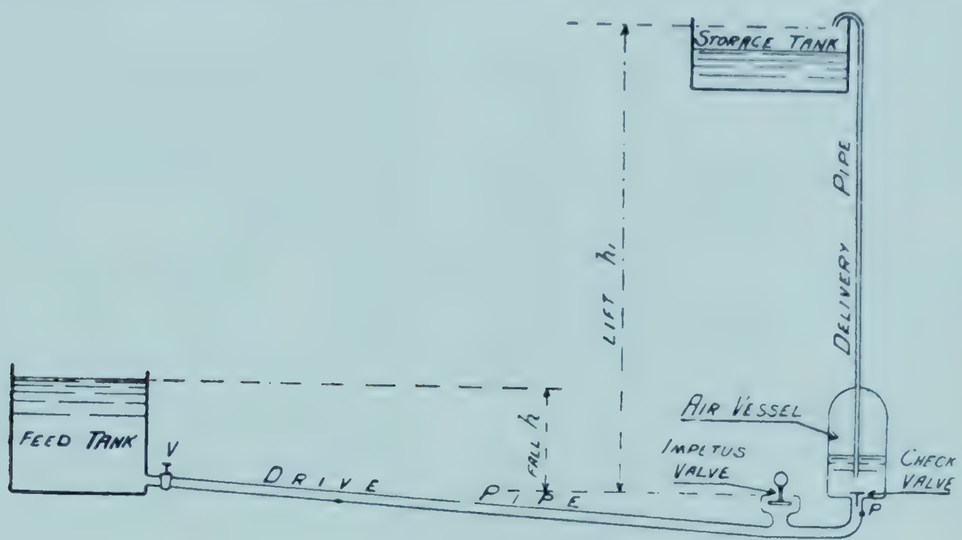


FIG. 1

As the result of over 1,100 experiments, Eytelwein gives the formula:

$$\text{Efficiency} = 1{\cdot}12 - 0{\cdot}2\sqrt{\frac{h_1}{h}}.$$

from which the following table has been calculated:—

TABLE II.

—	Lift h_1, 3 times the fall h.	Lift 5 times the fall.	Lift 8 times the fall.	Lift 10 times the fall.	Lift 15 times the fall.	Lift 20 times the fall.
Value of efficiency ..	0·774	0·673	0·555	0·488	0·345	0·226

The theoretical quantities in the first column of Table I. may now be changed into actual quantities by multiplying each of them by the corresponding efficiency in Table II., giving:—

TABLE III.

0·258 of the water supplied to the drive-pipe will be raised through a lift					3 times as great as the fall.		
0·134	"	"	"	"	5	"	"
0·069	"	"	"	"	8	"	"
0·0488	"	"	"	"	10	"	"
0·023	"	"	"	"	15	"	"
0·0113	"	"	"	"	20	"	"

The figures given in Tables I. and III. have been plotted in Fig. 3, giving the curves marked "theoretical" and "actual" respectively. The latter curve is useful for predicting the performance of a suitable ram under given conditions. For

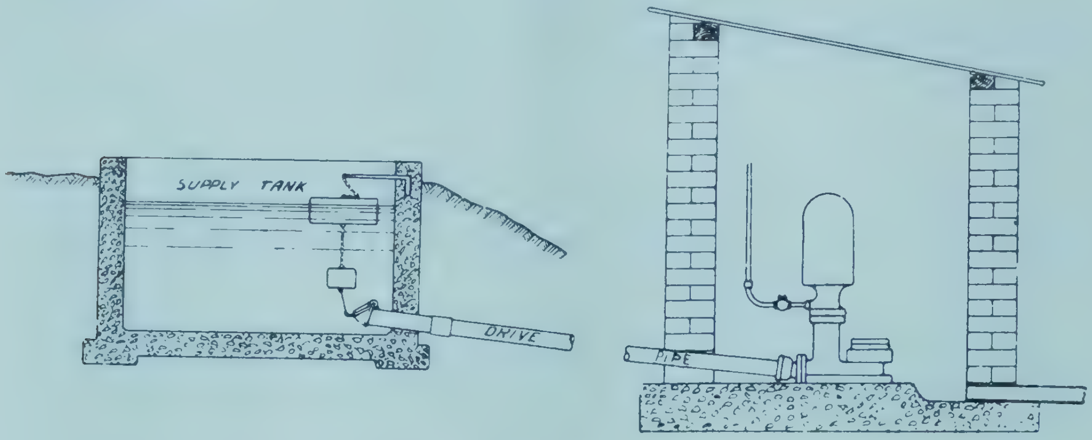


FIG. 2.

example, suppose we wish to find what fraction of the total water supplied to the drive-pipe will be raised through a vertical height h_1 (Fig. 1) six times as great as the fall h (Fig. 1), from point "6" in the base line erect a perpendicular to cut the "actual" curve in the point A. Through A, draw the horizontal AB. This gives OB, which, on measurement, is found to be equal to 0·105 or fully one-tenth. A similar method can be employed for any proportion of lift to fall.

Proportions, &c., of a Hydraulic Ram.

The following information is useful:—

The drive-pipe should be straight, *i.e.* free from bends, and not less in length than five times the vertical height (h. Fig. 1) of the fall of water.

In the case of small rams, the length of the drive-pipe should be about equal to the vertical height (h_1, Fig. 1) to which the water has to be raised. If it is shorter, water is liable to be forced back into the source of supply while the check valve is closing.

The above rules together imply that, for satisfactory working, the fall should not be greater than one-fifth of the lift.

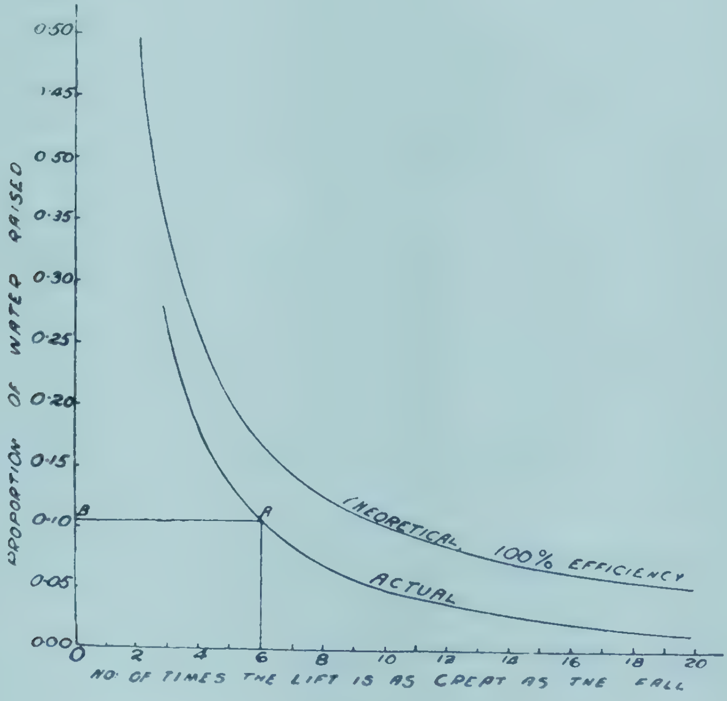


FIG. 3

The air-vessel plays two important parts, viz.:—

(1) The contained air acts as a cushion and minimises the stresses set up by water-hammer action.

(2) The air acts as a store of energy, being compressed by water entering the air-vessel during the working stroke and expanding again during the idle stroke (*i.e.*, while the impetus valve is open), so expelling the water that entered during the working stroke and maintaining a fairly constant flow through the delivery pipe.

Since, when the check-valve is closed, the pressure on the air in the air-vessel will be greater, the greater the vertical height of the delivery pipe, it is evident that the capacity of the air-vessel should be proportioned to suit. A good rule is: The cubic content of the air-vessel should be approximately equal to twice that of a portion of the delivery pipe, the length of which is equal to the vertical height (h_1) through which the water has to be raised.

If possible, turns should be avoided in the delivery pipe. When this is not possible, changes of direction should be effected by easy bends of large radius, so that there will be as little obstruction to the flow of the water as may be.

With a long drive-pipe there are fewer beats per minute than with a short one. In the case of a certain ram, with a drive-pipe 60 feet long, the beats numbered from 28 to 35 per minute, while with a drive-pipe approximately 8 feet long they varied from 100 to 150 per minute. The efficiency was nearly the same in the two cases, but it was more constant with the longer drive-pipe.

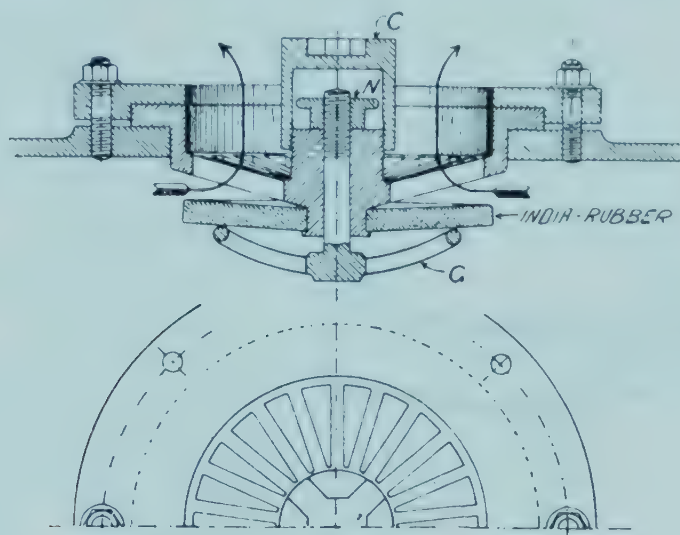


FIG. 4.

The following table is given by the Goulds Manufacturing Company:—

Table of proportionate head of fall giving highest efficiency in operation of hydraulic rams.

To deliver water to a height of	Place ram under	Conducted through
20 feet above ram	3 ft. head of fall	30 ft. of drive-pipe
30 ,, ,, ...	4 ,, ,, ...	30 ,, ,,
40 ,, ,, ...	5 ,, ,, ...	40 ,, ,,
50 ,, ,, ...	7 ,, ,, ...	50 ,, ,,
60 ,, ,, ...	8 ,, ,, ...	60 ,, ,,
80 ,, ,, ...	10 ,, ,, ...	80 ,, ,,
100 ,, ,, ...	14 ,, ,, ...	100 ,, ,,
120 ,, ,, ...	17 ,, ,, ...	125 ,, ,,

Messrs. Goulds also state that, for their rams—

"As a general rule, there should be 1 foot of fall for each 7 feet of lift, and the ram should never be installed under less than 3 feet of fall, as this is the smallest fall under which it will operate. The fall between the source of supply and the ram should not be greater than specified in the table above, as a greater fall causes an unnecessary strain on the ram and piping and will interfere with the operation of the ram."

Installation.

In the case of a stream, to supply the ram with water it may be necessary to construct a weir across the stream in order to form a pond. From the lower part of that pond comes the supply pipe. A strainer should always be placed on the inlet end of the supply pipe to prevent it and the ram from becoming choked with débris.

Sometimes the slope of the land is too gentle to allow of the required fall being obtained within the length the drive-pipe should be, according to the above rules. When this is so, the water may be piped from the source to an intermediate point at the required distance from the ram. At this point an open barrel can be located and the drive-pipe taken from it. The barrel can be connected to the source of supply by ordinary stoneware pipes at least a size larger than the drive-pipe, which leads from barrel to ram.

It is customary to place the ram in a small house. In cold countries, this prevents damage by freezing, but even when there is little fear of freezing, it is good practice to house the ram as a protection against the weather and damage from other causes. The ram should be high enough above the floor of the house to prevent the snifting valve from being submerged by the waste-water. This height need not be great,

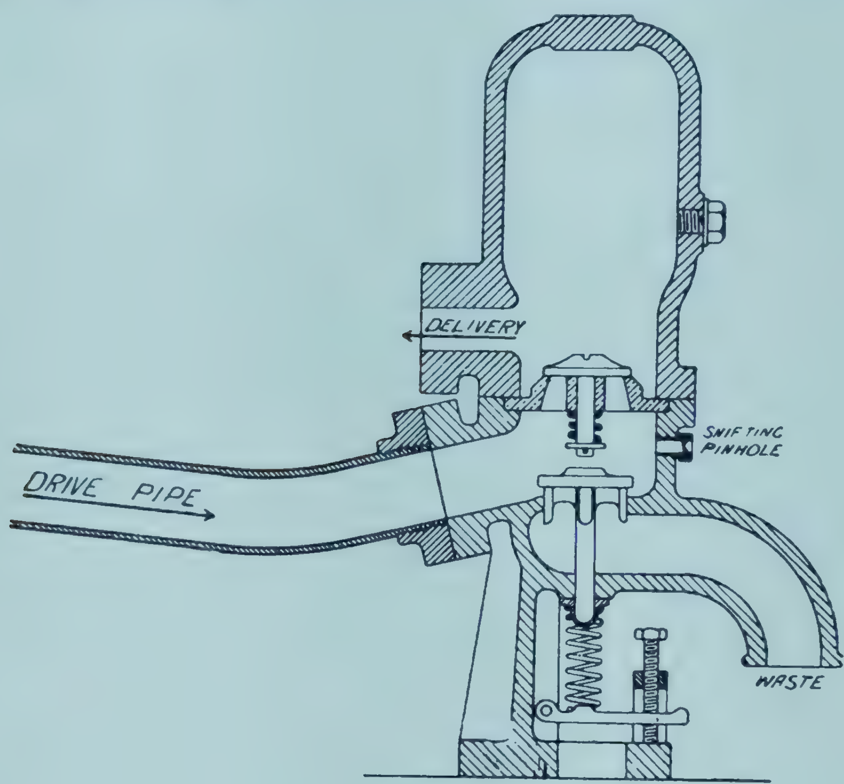


FIG. 5.

provided the drain from the ram-house is large enough and properly made. The ram should be bolted securely to a rigid timber or masonry foundation, which forms a solid support and relieves the connecting pipes from undue strain.

The inlet end of the drive-pipe should be placed so that it will always be completely submerged, otherwise the air may be drawn into the ram and will stop its action. This does not diminish the driving head, which is measured from the *surface* of the water in the supply pond or tank. Further, to prevent the ram from being stopped by air, all joints in the drive pipe should be airtight.

Examples of Rams and Ram Installations.

Figure 2 shows a Blake's "Hydram" installed for a small water supply. This ram is fitted with valves of the india-rubber disc type, which are silent in operation and diminish jarring and wear. Fig. 4 shows a vertical section through the impetus valve. The escape of the water is indicated by the arrows. The valve can be throttled or regulated by raising the wheel shaped guard G. This is done by removing the guard cap C and turning the nut N. Water enters the supply tank from some natural source. The drive-pipe is fitted with a flap valve, attached to a float, for starting and stopping the ram automatically. The lower float is just able

to keep the flap valve open after it has been raised by the upper float. When the water-level falls below the lower float, the flap closes and remains closed till the water level rises sufficiently to cause the upper float to again open the flap valve and restart the ram. As already stated, this arrangement of floats is only necessary for a very small water supply.

Fig. 5 illustrates the "Decoeur" ram. The valves are light in weight, and the impetus-valve spring can be adjusted to regulate the number of beats per minute to suit varying conditions. The escape, or waste, outlet should be kept submerged in order to give a suction effect which causes the water to give up some of its contained air, and so replenish the air-vessel automatically and reduce the violence of the action, and therefore also the noise and wear and tear. When this is done a snifting pin-hole or valve becomes unnecessary.

Occasionally circumstances permit of the arrangement shown in Fig. 6, which embodies some novel features.

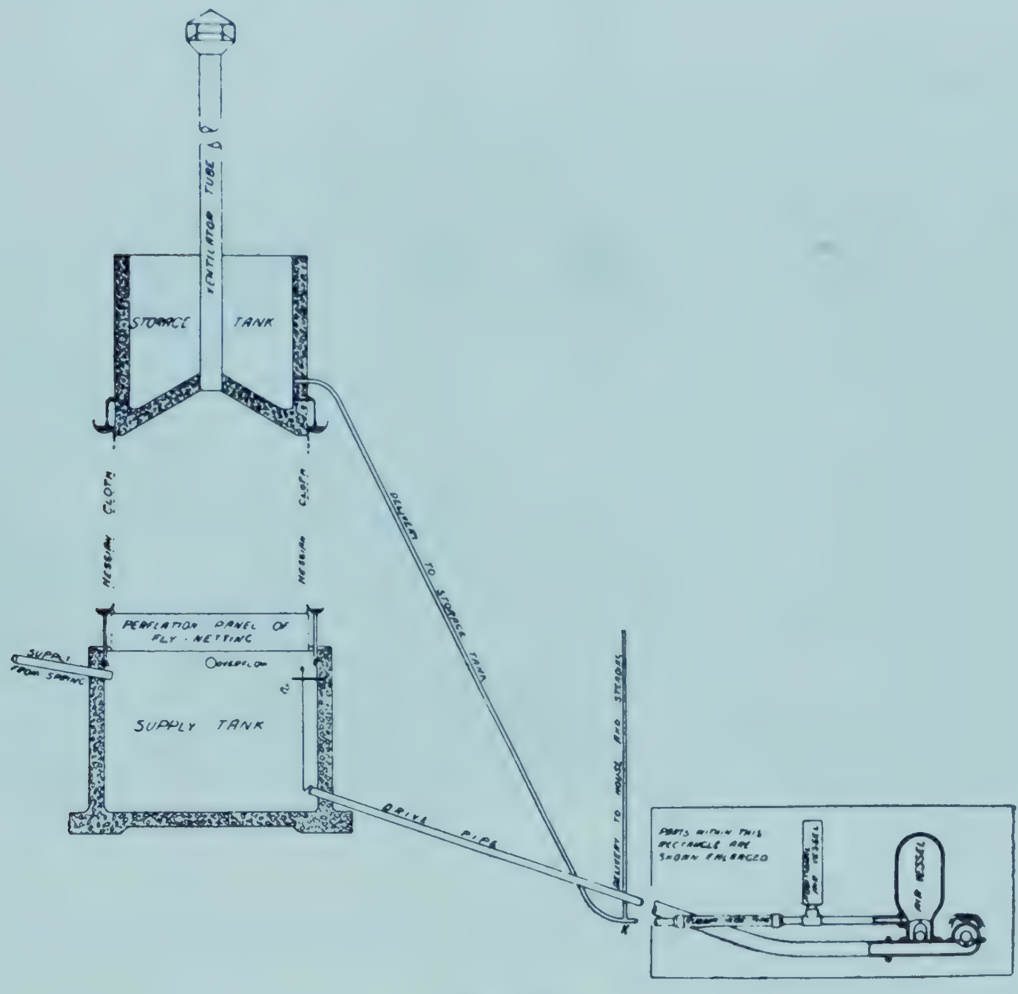


FIG. 6.

The storage tank is placed vertically above the feed tank, and a cool-storage chamber arranged between the two tanks. The cool-storage chamber consists of a framework covered with hessian cloth, over which water from the upper tank trickles, finally falling into the lower tank. The hessian cloth does not extend quite to the bottom of the walls, the lower 9 inches being occupied by a "perflation panel" of fly-netting. The door can be constructed similarly of hessian cloth stretched over a timber framework. The bottom of the upper tank is of pyramidal form, and from the apex a ventilation pipe of considerable length takes off.

Although, as a rule, it is customary to supply the homestead from the storage tank, sometimes, because of convenience or to effect a saving of piping, the pipe leading to the homestead branches off between the ram and the storage tank, as at K (Fig. 6). An objection to such a direct connection between ram and house is, however, that the continual noisy pounding becomes a nuisance. In the scheme under consideration this objection is overcome by the use of an additional air-chamber on

the discharge pipe, and also by the insertion of a piece of rubber hose between the ram and the junction of the pipe leading to the homestead. These devices have been employed at Wortham Farm, near New London, Wis., where it was found that the additional cushion furnished by the extra air-chamber and the flexibility of the hosepipe completely destroyed the propagation of sound.

Plan of a Typical Plant.

Fig. 7 is a sketch plan of a typical hydraulic ram installation. The portion of the stream shown has a considerable fall in its length. An open channel or a pipe is taken out of the stream above a weir thrown across the latter for the purpose of raising the water-level above it. This channel or pipe is laid out with only a small fall, much smaller than that of the stream, so that a considerable fall comes to be available between the level of the water in the feed tank and that of the water in the stream where the waste-pipe enters. The drive-pipe, ram, &c., can then be installed as shown.

By courtesy of Messrs. Stewarts and Lloyds.]

FIG. 7.

Rams forcing to a height of 719 feet. Showing a duplicate pair of ' B " Rams worked by impure water, with a fall of only 9 feet, and raising 4,500 gallons of spring water per day to a height of 719 feet, and to a distance of 1,223 yards. These serve a large Horse Stud Farm.

Inquiry Form.—When submitting inquiries, the following information should be furnished by the inquirers:—

(1) The vertical fall (in feet or inches) that can be obtained from the source of supply to the ram.

(2) The vertical height to which the water is to be forced above the level of the ram.

(3) The distance to which the water has to be forced—*i.e.*, the length of the delivery pipe-line.

(4) The approximate quantity of water (in gallons or cubic feet) falling per minute.

(5) The number of gallons required to be raised per day of 24 hours.

(6) The distance in which the working fall is obtained.

Measuring the Driving Water.

Unless the driving water is practically unlimited, it is necessary to measure the flow. An easy method of computing the flow of a *small* spring or stream, is to dam it up temporarily, and in the dam embankment insert a short length of iron pipe to form a spout.

The measurement should be made by two persons—one to take the time and the other to catch the water in a receptacle of known capacity. The time taken to fill the receptacle is noted, and hence the discharge is calculated.

If the flow is rather too much to measure in this way, two, three, or more pipes may be inserted in the dam embankment and when they are all running steadily, the discharge from each in a given time can be measured, as described above. It is not necessary, of course, that each spout should be made to deliver the same quantity.

A flow up to 250 gallons per minute can be measured in this way.

For larger flows, a rectangular gauge notch or weir may be used, as shown in Fig. 8. It consists of a board with a rectangular notch cut out of it to a width of about two-thirds that of the stream immediately above the weir. The bottom and sides of the notch should be bevelled away on the down-stream face, so as to present a more or less sharp edge to the approaching water, or the notch may be cut out of a piece of thin metal, screwed to the board. The notch should be truly rectangular

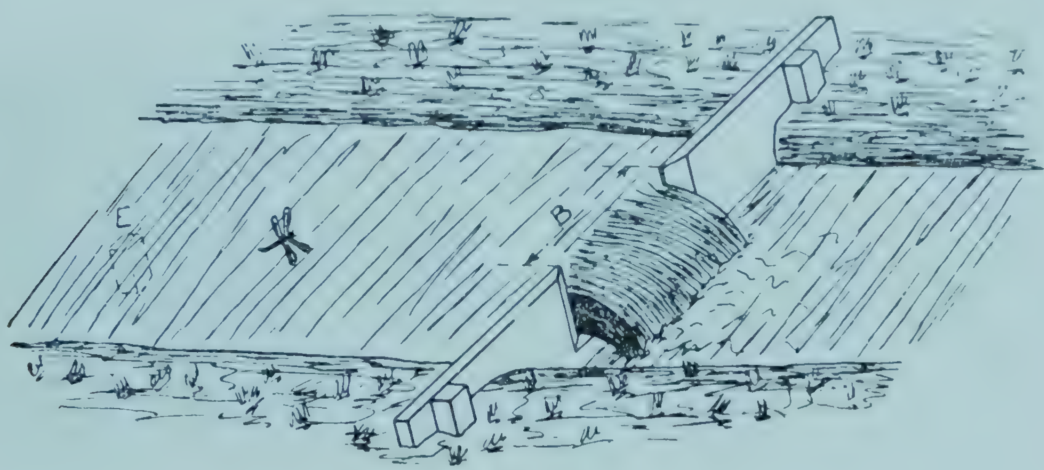


FIG. 8.

and the board or boards that constitute the weir should be let into the banks and bed of the stream and well luted with clay, care being taken to get the bottom or "lip" of the weir horizontal.

A stake "E" is driven into the bed of the stream not less than 3 ft. upstream of the weir, until its top is level with the lip of the weir. This may be done, working with a board with parallel edges and a spirit-level, the board extending from the lip of the weir to the top of the stake and having the spirit-level placed on the top of it. The stake is hammered in till the bubble of the spirit-level comes to mid-run.

A part of the stream should be selected where the water can approach the notch quietly (at a speed of not more than 6 in. per second). Also, the surface of the water down-stream of the weir should be at least 9 in. lower than the lip of the weir.

Measure "B" and "H" (the depth of water above the head of the stake) in inches; then "Q," the discharge of water in cubic feet per minute is calculated from the following formula:—

"Q" (cubic feet per minute) $= 0.4 \text{ BH} \sqrt{\text{H}}$.

For example, suppose "B" is 36 in. and "H" is found to measure 9 in., then:—

$Q = 0.4 \times 36 \times 9 \times \sqrt{9}$.

$Q = 0.4 \times 36 \times 9 \times 3$.

$Q \times 389$ cubic feet per minute.

Any other case can be dealt with in like manner.

BREEDS OF PIGS.

E. J. SHELTON, H.D.A., Instructor in Pig-Raising.

The first article of this series, "Classification of Pigs," was published in the last Journal. In succeeding issues other breeds of Pigs and matters of moment to Pig raisers generally will be discussed.—Ed.

THE BERKSHIRE OR THE IMPROVED BERKSHIRE.

Of the several breeds of pigs suited to the climatic conditions and to the environment of Queensland, none appear to be so popular or so widely distributed as the Old English Berkshire, also commonly known as the Berkshire, or more recently still as the Improved Berkshire. The type was named after the county in which it was originally developed and bred, and is considered to be the oldest of the improved breeds of pigs.

Historical records away back in the days of 1820 indicate that one Lord Barrington did much to improve this breed, which was at that time of a very much heavier and coarser type than is common nowadays. They were of a vari-coloured type—some were white, some quite black, whilst some were black and white with a large patch of white on the shoulder; some were rough-coated, others fine, and they were not noted for any special characteristics.

Herbert Humphrey was a very successful breeder of the type in 1862, the year when the breed was first given a separate class at agricultural shows, and he was the chief mover in establishing the British Berkshire Society. For over twenty years he compiled the Herd Book and edited its proceedings. Since then breed societies, like the show yard, have exercised a stronger influence on type and quality than any other institution.

Berkshires are undoubtedly the most popular and the most suitable of the dual-purpose types. They were among the first to be improved and, seeing that they are suited not only to the cooler weather conditions prevailing in England, Europe, and America, but to the warmer climates of Africa, the Islands, and Australia, they rapidly become acclimatised and may be adapted to almost any conditions.

The breed possesses a ready aptitude to fatten, either as porkers or baconers, and can be killed to advantage from 4½ to 12 months old, the 6-months-old pigs being the most profitable. It costs more to feed them after they scale 130 lb. dressed, and the bacon-curers class them in a lower grade if too coarse or too heavy.

The Quality of Berkshire Pork and Bacon.

The average quality of Berkshire pork and bacon is such that it can be graded as extra prime. The fat and lean meat are fairly intermixed and of excellent quality. The pigs dress out well in proportion to their live weight. The large and lengthy framed Berkshire with a medium to short head and a fine coat of hair is much sought after. These are noted for early maturity, quick growth, and for prolificacy—three very desirable characteristics in any breed of pig.

The report of the British Berkshire Society states that the chief characteristics of the breed are their hardiness, active disposition, general conformation, and their evenly developed carcass, whilst as a breed they are unsurpassed as grazers and foragers. As a result of their strong digestive and assimilative powers their increase in weight is large in proportion to the amount of food consumed.

Their Early History.

It is recognised, of course, that Chinese, Neapolitan, and perhaps also Siamese pigs were used for mating with the Old English wild pig to form the foundation of the new type, and doubtless the prepotency of the Old Chinese type (which was white) has been handed down through the ages of improvement. The older types of Berkshire, as illustrated in a very old oil painting in possession of the Agricultural Department of the University of Edinburgh, shows the breed as of a chestnut colour with dark patches through the hair. Russet-coloured spots were common, and these still appear in Berkshires that show a tendency to degenerate. The colour comes out very strongly in second and third crosses of these types.

The Journal called "The Complete Grazier," in an issue of 1845, describes the breed after it had been materially improved from the standard of the earlier days, as in colour reddish brown, with brown or black spots, sides very broad, legs flat, ears large and pendulous over eyes, body thick, close, and well made.

PLATE 102.—A GROUP OF SELECTED BERKSHIRE BROOD SOWS.

Sows of this description always realise good values in normal seasons, and are worth especial care.

PLATE 103.—A CHAMPION BERKSHIRE BOAR FROM THE STUD OF A. C. STEWART, PRESIDENT OF THE BERKSHIRE AND YORKSHIRE FEDERAL GENERAL COUNCIL OF AUSTRALASIA.

This Boar

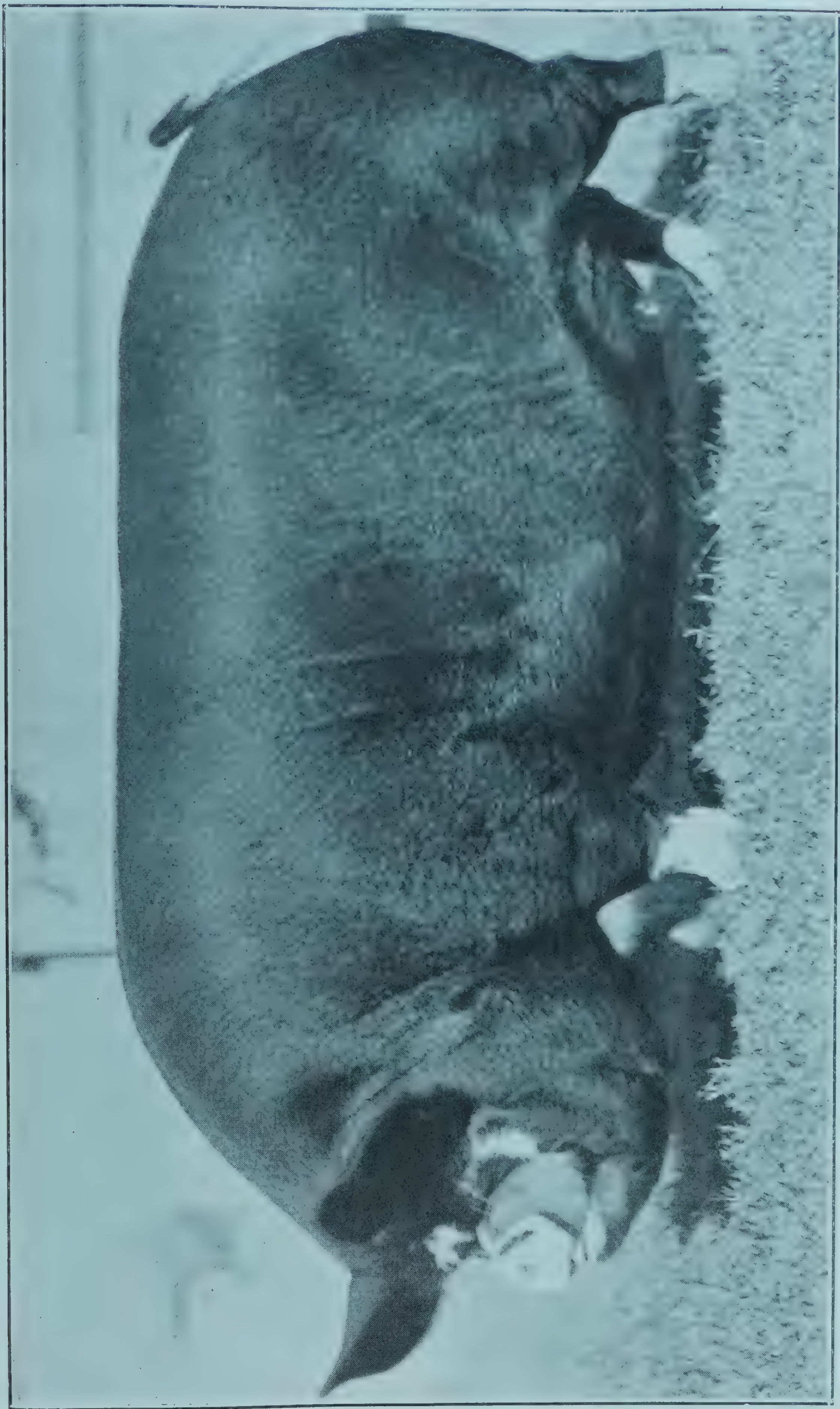


PLATE 104.—A VICTORIAN BRED BERKSHIRE SOW "TOPSY OF YARRA."
Property of G. A. Bedwell. This sow won many prizes at Victorian and New South Wales Show.

PLATE 106.—BERKSHIRE SOW "BRENTWOOD DOROTHY."

Property of McPhee, Bros., of the Clarence River, N.S.W. A Champion prize winner of excellent type. Note her length, depth, and compactness.

The Modern or Improved Type of Berkshire.

There can be no denying the fact that the Berkshire has undergone more changes in type under the influence of the showyard in recent years than any other breed of pig which has been recognised in prize schedules for an equal length of time. There never was a time when quality and type was more keenly sought after and obtained by the breeder than now. There is no call nowadays for the long-nosed, rough-coated type of years ago.

Prominent amongst the characteristics for which the Berkshire is noted are:—

(1) Great muscular power and vitality, which renders them less liable to disease than any other breed. The boars are prepotent to a degree; the sows are fairly prolific.

(2) Activity, combined with strong digestive and assimilative powers; hence Berkshires return a maximum of flesh and fat for the food they consume. They are good "doers."

(3) The sows are careful nurses and good sucklers, and all are excellent grazers. They possess good limbs, and good-quality, fine, flat bone.

(4) The young pigs are strong, smart, and active at birth, consequently are less liable to mishap.

(5) They can be fattened for market at any time, whilst they can be fed to any reasonable weight desired.

(6) The flesh provides a high-quality pork and bacon much sought after, both by pork-buyers and bacon-curers.

(7) The Berkshire boar possesses remarkable powers in transmitting the valuable qualities of the breed to his progeny when used as a cross. This power is called "prepotency." No breed has been used more extensively for cross-breeding purposes or has been found so useful for refining the progeny of coarser types.

(8) Berkshires possess unsurpassed uniformity in colour markings and quality. They reproduce themselves faithfully. Their reasonable size, quick growth, and easy fattening powers, with uniformity and hardiness, make them a favourite with breeders of pigs generally.

The Modern Type.

The modern—or, as it is frequently erroneously styled, the "improved" Berkshire —is medium in size, trim, and free from roughness. They are well modelled and possess the very necessary length and depth of body and hams. The face is short and dished, the ears fine and erect and slightly pointed; the hair thick and fine, according to type, without "swirls" or "roses" (both faults in the showyard). To the pig fancier the modern Berkshire has a captivating and symmetrical outline.

When slaughtered, Berkshire flesh has a fine texture with the proper proportion of fat and lean. The meat is sweet and of good flavour. This is the result of quick growth and early maturity.

Both boars and sows have an excellent disposition; they are quiet, docile, and contented, and it is uncommon to find a bad-tempered fence-breaker amongst them.

The breed is fairly prolific under local conditions, and this characteristic can be distinctly improved by careful selection and breeding. In-and-in breeding, breeding too closely, and neglect soon tell their tale in reduced and irregular breeding powers. This also lowers the standard of quality and causes the animals to be classed as "slow growers."

Both the fine- and the thick-haired types do well here. The former or a medium type is the more popular.

The Breed Societies.

Following on after the formation of the British Berkshire Society in 1845, the American Berkshire Association in 1875, the National Berkshire Record in 1893, and the Berkshire and Yorkshire Society of Australasia in 1900 were organised. This has resulted in an extensive distribution of the type throughout the world. To-day in Australasia they stand at the head of the list as being most easily adapted to any climate, soil, or condition, and will reproduce with equal facility and quality both for pork and bacon.

The Berkshire as a Breeder.

The Berkshire sow makes an excellent, contented mother—sturdy, vigorous, and thrifty, cleanly in habit (if given a chance to be so), fairly prolific, averaging from 8 to 10 pigs reared per litter. The suckers when born are lively, sturdy, keen, and develop rapidly.

Plate 107.—A Popular Type of Berkshire.

Note the full development of udder and teat. This Sow would produce large quantities of milk, and thus be able to suckle a large litter.

Plate 108.

This Berkshire Sow shows a wonderful development of udder and teats. She was a proved breeder of first-class Pigs.

Sows should not be retained as breeders when over seven or eight years of age, as they lose their teeth and often become very clumsy and poor sucklers. They can, of course, be fattened and marketed as back fatters if food is reasonably cheap and plentiful.

If the stock are too finely bred, however, they deteriorate and produce puny litters. The breed exercises a powerful influence in the production of good typed pigs in country districts. Cross breeding can thus, by the maintenance of pure, strong, prepotent types, be made of considerable local value.

Berkshire Boars.

Some very high prices have been secured for Berkshire boars abroad. We have record of a genuine Canadian sale of the Berkshire boar "Premier Longfellow," who was champion at St. Louis State Fair in 1916, and at the sales realised £400. The record price in England is £500, whilst Berkshire sows have also topped the sales on many occasions. Stud pigs have never realised these prices in Australasia, but from 50 to 75 guineas each has been paid on several occasions in New South Wales and Victoria for selected animals.

A few years ago it was considered that the Berkshire was much superior to any other breed in prolificacy, but many breeders, taking advantage of the opportunities at auction sales of stud pigs and in show ring, have followed a system of excessively fattening their animals. This has in some instances resulted in a loss of refinement and quality in the young stock, and a still more serious defect in the loss of hereditary prepotency.

It has been truly said that the "pig is what the breeder and feeder make it."

The show yard winner of to-day is, unfortunately, often a short, chubby, unprofitable animal with an unnatural obesity, thick heavy forequarters, and poor breeding powers.

Herd Book Standards.

One breed may rise—another fall,
The Berkshire breed survives them all.

The principal points of the Berkshire breed, as set out in the Herd Book standards of the British Berkshire Society, are as follows:—

Colour.—Black with white blaze on the face. Four white feet, and white flag on the end of the tail.

Head.—Of medium size, broad between the eyes and ears, with an even and well-dished face, broad and fleshy.

Eyes.—Bright, kindly, and intelligent; dark hazel or grey in colour.

Ears.—Thin, pricked or cocked, inclined slightly forward, and fringed with fine silky hair.

Jowl.—Full, clean, light, and running well into the neck.

Neck.—Short, muscular, and broad.

Chest.—Wide, deep, and full, with good girth.

Back.—Long, straight, or slightly arched, with well-sprung, broad ribs.

Sides.—Deep and well let down, with even and level underline.

Loin.—Full and wide, powerful, and not drooping.

Belly.—Full, round, and with at least twelve teats.

Flank.—Thick, well back, and reaching down on to leg.

Quarters.—Wide and lengthy, set well away from the tail.

Hams.—Broad, long, deep, and fleshy down to the hock.

Tail.—Fine, tapering, short, and well set up; nearly level with the back.

Legs and Feet.—Short, straight, strong, with flinty flat bone, set wide apart. Hoofs nearly straight, firm, and compact.

Pastens.—Short and springy.

Skin.—Smooth, pliant, scurfless, and free from wrinkles.

Hair.—Plentiful, fine, soft, and with a tendency to thickness.

Objections.—Objections are a perfectly black face, foot, or tail, a "rose" back, white or sandy spots on the body, a white ear, a very coarse mane, and inbent knees. Rupture in the case of a boar or only one testicle let down, and in sows irregularly placed or blind teats.

REPORT ON EGG-LAYING COMPETITION QUEENSLAND AGRICULTURAL COLLEGE, OCTOBER, 1923.

The weather somewhat improved since issue of last report, and the laying of the birds has been practically the same, with the exception that broodiness has been on the increase, especially among the leading teams of the heavy breeds. The best scores for the month in the light breeds were those of Messrs. W. and G. W. Hindes 162, and Mr. N. A. Singer with 159 eggs. In the heavy breeds Mr. Jas. Potter scored 145 and Mrs. A. E. Gallagher 144 eggs. Mr. R. Burns replaced his F bird, the original competitor having been destroyed for oviduct trouble. Results:—

Competitors.	Breed.	Oct.	Total.
	LIGHT BREEDS.		
*C. H. Singer	White Leghorns	158	950
*W. and G. W. Hindes	Do.	162	932
*N. A. Singer	Do.	159	924
*Oakleigh Poultry Farm	Do.	156	856
*Ancona Club	Anconas	134	827
*S. L. Grenier	White Leghorns	127	812
*Beckley Poultry Farm	Do.	137	787
*H. P. Clarke	Do.	150	776
*Rock View Poultry Farm	Do.	128	770
*Mrs. L. Andersen	Do.	130	770
*J. W. Newton	Do.	142	770
F. Sparsholt	Do.	122	759
*O. Goos	Do.	123	758
*R. C. J. Turner	Do.	137	755
*J. M. Manson	Do.	125	747
*Geo. Williams	Do.	132	735
*J. W. Short	Do.	123	727
*Bathurst Poultry Farm	Do.	122	719
*Arch. Neil	Do.	126	718
*C. A. Goos	Do.	130	707
Jas. Hutton	Do.	108	705
*Mrs. R. E. Hodge	Do.	126	695
G. Marks	Do.	119	693
*A. C. G. Wenck	Do.	123	686
G. E. Rogers	Do.	113	668
*H. Fraser	Do.	111	662
*J. Purnell	Do.	133	649
W. Becker	Do.	116	645
W. A. and J. Pitkeathly	Do.	116	645
J. Harrington	Do.	101	640
C. Quessell	Do.	116	623
W. and G. W. Hindes	Brown Leghorns	108	610
E. Ainscough	White Leghorns	123	610
Jas. Earl	Do.	107	603
Chapman and Hill	Do.	108	603
*N. J. Nairn	Do.	127	592
*Mrs. E. White	Do.	105	589
Parisian Poultry Farm	Do.	114	568
	HEAVY BREEDS.		
*W. Becker	Chinese Langshans	132	867
*R. Burns	Black Orpingtons	140	[illegible]
*Jas. Potter	Do.	145	849
*Jas. Ferguson	Chinese Langshans	136	839
*Mrs. A. E. Gallagher	Black Orpingtons	144	823
*Jas. Hutton	Do.	124	802
J. R. Douglas	Do.	122	763
*Mrs. A. Kent	Do.	135	762
*Parisian Poultry Farm	Do.	139	761

EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE—*continued.*

Competitors.	Breed.	Oct.	Total.
HEAVY BREEDS—*continued.*			
*E. Walters	Black Orpingtons	126	757
*T. Hindley	Do.	136	743
*E. F. Dennis	Do.	119	736
W. T. Solman	Do.	124	729
*R. Holmes	Do.	122	716
*H. M. Chaille	Do.	107	711
R. Conochie	Do.	109	700
*J. H. Jones	White Wyandottes	122	674
*C. C. Dennis	Black Orpingtons	120	673
Beckley Poultry Yards	Do.	107	664
G. E. Rogers	Do.	113	663
Rev. A. McAllister	Do.	117	649
H. B. Stephens	Do.	124	641
W. F. Ruhl	Do.	103	627
Jas. Ferguson	Plymouth Rocks	101	609
W. G. Badcock	Chinese Langshans	103	581
V. J. Rye	Black Orpingtons	100	565
F. J. Murphy	Do.	117	519
Jas. Ferguson	Rhode Island Reds	100	464
Mos. Stephens	Black Orpingtons	95	437
Totals	..	8,279	47,476

* Indicates that the pen is being tested singly.

DETAILS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
C. H. Singer	143	193	158	139	152	165	950
W. and G. W. Hindes	141	163	148	141	170	169	932
N. A. Singer	139	162	170	161	147	145	924
Oakleigh Poultry Farm	156	150	133	135	151	131	856
Ancona Club	128	145	168	112	129	145	827
S. L. Grenier	123	139	149	133	140	128	812
Beckley Poultry Farm	136	118	111	136	144	142	787
H. P. Clarke	141	101	142	122	138	132	776
Rockview Poultry Farm	138	149	131	127	109	116	770
Mrs. L. Andersen	103	137	142	141	123	124	770
J. W. Newton	139	135	122	107	130	137	770
O. Goos	112	133	139	127	117	130	758
R. C. J. Turner	122	129	124	125	114	141	755
J. M. Manson	119	114	143	145	122	104	747
Geo. Williams	138	140	109	112	126	110	735
J. W. Short	122	118	123	130	129	105	727
Bathurst Poultry Farm	124	124	105	133	124	109	719
Arch Neil	106	122	100	136	139	115	718
C. A. Goos	121	135	98	125	108	120	707
Mrs. R. E. Hodge	110	118	108	128	122	109	695
A. C. G. Wenck	118	104	108	118	107	131	686
H. Fraser	119	104	108	108	112	111	662
J. Purnell	112	104	113	98	123	99	649
N. J. Nairn	109	80	109	101	97	96	592
Mrs. E. White	80	100	117	110	101	81	589

DETAILS OF SINGLE HEN PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
HEAVY BREEDS.							
W. Becker	148	155	156	144	139	125	867
R. Burns	151	135	140	132	196	113	867
Jas. Potter	127	157	124	137	133	161	849
Jas. Ferguson	150	156	135	128	131	139	839
Mrs. A. E. Gallagher	131	144	139	139	133	137	823
Jas. Hutton	142	140	139	130	131	120	802
Mrs. A. Kent	114	159	109	160	114	106	762
Parisian Poultry Farm	96	125	128	143	138	131	761
E. Walters	151	151	115	111	115	114	757
T. Hindley	127	138	140	133	108	97	743
E. F. Dennis	134	135	117	116	116	118	736
R. Holmes	105	104	124	118	129	136	716
H. M. Chaille	110	140	128	125	100	108	711
J. H. Jones	115	125	123	112	84	115	674
C. C. Dennis	118	126	84	119	112	114	673

TRUENESS TO TYPE.

—	Class.	—
LIGHT BREEDS.		
S. L. Grenier	I.	Good type and stamina; A a poor feeder.
H. P. Clarke	I.	Good type, stamina, and size.
G. Williams	II.	Good type and stamina, with the exception of B, which is of poor type.
W. and G. W. Hinds	I.	Good type and stamina; a splendid team; good workers.
C. H. Singer	I.	Good type and stamina; F a little on the small side.
H. Fraser	I.	A fair team; F a little on the light side.
Arch. Neil	I.	A fair team; F somewhat too blocky.
J. A. Manson	I.	Good type and stamina.
Mrs. R. Hodge	I.	Good type and size; plenty of weight.
N. J. Nairn	I.	Fair type; somewhat slow feeders.
J. W. Short	I.	Good type and stamina; F rather too much headgear.
Bathurst Poultry Farm	I.	A fair team; just passes.
A. G. C. Wenck	I.	A fair team; E rather too much comb.
C. A. Goos	I.	Good type and stamina; good length of back.
J. Purnell	I.	A good team, of fair type.
L. Andersen	I.	Good stamina; fair type.
O. Goos	I.	A fair team; E rather nice type.
Rockview Poultry Farm	I.	A good team, and good size.
Mrs. E. White	I.	Good type and size; slow feeders.
Ancona Club	I.	Good type and stamina; rather a smart team.
R. C. J. Turner	I.	Good type and stamina; size good.
Beckley Poultry Farm	I.	Good type and stamina.
J. W. Newton	I.	Good type and stamina; A bird somewhat small across shoulders.
Oakleigh Poultry Farm	I.	Good type; splendid team.
N. A. Singer	I.	A good team; D would be better for a little more size.
Jas. Earl	I.	Good type and stamina.
G. Marks	I.	A fair team; could do with less headgear.
Jas. Harrington	I.	Good stamina; a very fine team.
Parisian Poultry Farm	I.	Good stamina; F bird good quality.
W. A. and J. Pitkeathly	I.	Fair type; good stamina; A high tail carriage.
C. Quesnell	I.	Good stamina and type; D a good bird.

TRUENESS TO TYPE—*continued.*

—	Class.	—
		LIGHT BREEDS—*continued.*
W. and G. W. Hinds (B.L.)	I.	A nice team; good stamina.
W. Becker	I.	Good type and stamina; F the best bird.
G. E. Rogers	I.	A fair team; good stamina; passable type.
E Ainscough	I.	Good type; C rather high in comb.
F. Sparsholt	II.	Differing in type; on small side; good stamina.
Chapman and Hill ..	II.	A fair team; F bird too narrow across shoulders, and poor stamina.
Jas. Hutton	I.	Good stamina, fair type, somewhat high on legs.
		HEAVY BREEDS.
J. H. Jones	I.	Good type and stamina.
E. Walters	I.	Fair type; A and B fine birds; good eyes.
Jas. Potter	I.	Good type; would be better for more size; just pass.
Parisian Poultry Farm	I.	A good all-round team.
Jas. Ferguson	I.	Nice type; good stamina.
R. Holmes	I.	Good type; fair workers.
Jas. Hutton	I.	A splendid team; nice heads and eyes.
R. Burns	I.	Good type and stamina; E rather short in leg, but a splendid worker; good head and eye.
Mrs. A. E. Gallagher ..	I.	A fair team; good stamina.
E. F. Dennis	I.	Fair type and stamina; A not so good in type.
T. Hindly	I.	Good type and size; nice team.
C. C. Dennis	II.	Type poor; D bird small and of poor type.
Mrs. A. Kent	I.	A fair team; good stamina and size.
H. M. Chaille	I.	Good type; plenty of size and stamina.
W. Becker	I.	Good type; fair stamina; E rather light in eye.
R. Conochie	I.	Good type and stamina; C splendid type for a layer.
J. Ferguson (R. I. Reds)	I.	A fair team; good stamina; rather light eyes; C the best bird.
W. G. Badcock ..	I.	Good type and stamina.
Mos. Stephens	I.	A fair team; D the best type.
G. E. Rogers	I.	A fair team; C rather high tail carriage.
F. J. Murphy	I.	Fair type; good stamina; passable team.
H. B. Stephens.. ..	I.	A fair team; good stamina and size.
Beckley Poultry Farm	I.	A fair team; passable type.
V. J. Rye	II.	Five birds; good stamina, and fine type; E poor type, and small.
J. Ferguson (Ply. Rocks)	I.	Good type; good even team; A a fine bird.
W. G. Solman	I.	Good stamina; type passable; rather high tail carriage.
Rev. A. McAllister ..	I.	Good type and stamina; fine size.
W. F. Ruhl	I.	Good type; plenty of size.
J. R. Douglas	I.	A fair team; good size and stamina.

P. M. PITT, Acting Principal.

QUEENSLAND TREES.

By C. T. WHITE, Government Botanist, and W. D. FRANCIS, Assistant Botanist.

The Ribbonwood (*Euroschinus falcatus*) is a large rain-forest or scrub tree attaining a height of about 130 feet and a trunk diameter of about 3 feet. The stem is often buttressed at the base in the large trees. The bark is brown and somewhat scaly, and sometimes slightly wrinkled. When the bark is cut it is seen to be brownish-pink in colour. The trees grow in the coastal rain forests from the Hastings River, New South Wales (Bentham), to the Endeavour River in North Queensland. They are found as far inland in Queensland as Bunya Mountains in the South and Stannary Hills in the North. The timber is pale brown in colour, light in weight, and pleasingly marked. It should be a good timber for cabinetwork and indoor fittings.

Photo. by the Authors.]

PLATE 109.—THE RIBBONWOOD (*Euroschinus falcatus*).
A Tree in the Imbil Rain Forests.

Photo. by Department of Agriculture and Stock.]

PLATE 110.—THE RIBBONWOOD.

OUR NATURAL GRASSES.*

Australia is particularly fortunate in possessing such a grand variety of indigenous grasses and bushes on which live stock thrive so well. Possibly no other country in the world is so well provided for in this respect as the Commonwealth. The different species of native grasses of Australia number over 350, and, compared with her neighbouring States, Queensland has far more than her share of these magnificent grasses. The average person can hardly realise to what extent the pastoral industry of Queensland is dependent upon her Mitchell, Flinders, Blue, Kangaroo, and many other varieties of native grasses.

Kangaroo Grass.

Perhaps of all the natural grasses of Australia, the *Anthistiria ciliata* (Kangaroo grass) is the most valuable, on account of the wide range of country over which it is spread. It is held particularly in high esteem in the latitudes south of Queensland, where in summer it provides fine, nutritious feed for stock. If the weather proves favourable it supplies green herbage right into the autumn. The brown colour usually assumed by kangaroo grass at that period of the year may leave the impression upon the casual observer that the grass has then lost its nutritive properties, whereas in truth it is at its best, the large seed heads, so distinctive a feature of this particular grass, having fine fattening qualities. All classes of live stock are particularly fond of the grass, with the result that it is liable to be "eaten out" if the stock are kept upon it for too long a period, and especially so if sheep comprise the live stock, as they crop it down so closely. Evidence of this is seen frequently along the enclosures of railway lines, where kangaroo grass can often be observed, waving its heads over the top of the fencing, while adjoining paddocks have been completely denuded of it. Those settlers who appraise it at its true value are careful to observe that the pastures are not overtaxed from the time it vegetates in the spring until the flowering stage in December has passed. It likes good drainage, and appears to revel on a gradually sloping hillside. Stock in Queensland do not eat it with that avidity so noticeable in southern latitudes, but possibly this is due to the form here appearing somewhat coarser. The stems of this grass in Queensland can be seen growing to 5 feet high. The leaves are narrow, and the grass grows in tussocks, which are of wider spread in the Southern States as compared with the Northern parts. It belongs to the Andropogon tribe of grasses, of which Queensland possesses many valuable varieties.

Blue Grass.

One of the best is *Andropogon sericeus* (blue grass), which grows from 2 to 4 feet high. The tussock it forms is leafy, with a bluish-green tint, the stems being numerous and erect, with a branching habit at the base. It is held in such high repute for fattening purposes that many graziers neglect to let it seed every few years, as is necessary, with the result that in parts is has become almost eaten out. Being a lover of rich lands, it is seldom met with on the poorer classes of soil, although, to compensate for this, as it were, its near relative, *Andropogon affinis,* is found usually on poor, dry land. Another of Queensland's Andropogons is the *refractus* (broken spiked grass), of bluish-green colour, which attains a height of from 2 to 4 feet. It is one of the most common grasses of Queensland, and, despite being rather coarse, provides a large quantity of summer feed.

Mitchell Grasses.

One of the grasses that has helped considerably in making the name of the Warrego district well and widely known as good sheep and cattle country is the *Neurachne Mitchelliana* (mulga grass), possessing knotty stems, of a creeping habit, which send up erect branches. It is alleged to have derived the name of "mulga grass" from the natives, who called it after a species of acacia of that name. It keeps up a growth of grass after other sorts have disappeared. The *Astrebla pectinata* (coarse Mitchell grass), grows erect from 1 to 2 feet high, being a valuable pasture grass. *Danthonia pectinata*, another Mitchell grass, is of coarser and more upright growth than the other. The well-known Roley-Poley grass (*Panicum macractinium*) is to be found on rich downs, and on poor sandy ridges. Its stems, from a spreading base, reach from 1 to 3 feet high, providing excellent bottom feed. The panicles when dry, become very brittle, and snap off easily, with the result that the wind-borne tops of this grass can at times be seen piled against wire-netting fencing to its complete height, and one may easily imagine what would happen to the fencing were a fire to occur.

* "The Queenslander," 24/11/23.

Panick Grasses.

In the northern parts great numbers of birds live on the seeds of the valuable Panick grasses, and, in the pioneering days, the natives used to pound the seed into a kind of coarse flour, from which they made cakes. One of the most notable of these is *Panicum crus-galli* (the large cocksfoot, or "barnyard" grass), which ranges from 2 to 6 feet in height, having broad leaves with dense panicle. It is a succulent grass, which sometimes is sown in damp situations, for cutting, like sorghum, for dairy cattle, as when cut early it makes a good second growth. Horses in particular are fond of this fodder. The *Panicum flavidum* (Van Dyke grass), which provides a large quantity of succulent feed, flourishes well on the high lands around Brisbane, and is widely distributed, growing remarkably well beyond Springsure. *Panicum leucophæum* (weeping cotton grass) is prolific, both as regards seed and herbage, and, although its favourite soil is a sandy loam, it is even found on poor, dry soils.

Judgment Needed.

The seeds of the Stipa grasses are awned, and adhering to the wool of the sheep, often force their way beneath the skin, occasionally causing death by penetrating the vital organs. Many a grazier can prevent his wool being damaged in value by masses of seed prickles becoming entangled therewith by placing his sheep in paddocks where there is only a comparatively short growth of grass before shearing time arrives. The owners of some stations arrange their shearing to take place before the time the grass seeds have sufficiently developed to become a serious nuisance.

Drought Resisters.

No imported grasses have proved the equal of the native herbage in resisting the drought conditions that are liable to prevail in Australia. It is remarkable how well and long our indigenous grasses cling to life, even in the central parts of the continent, under most adverse conditions, and a good season, after a drought, has often been sufficient to convert vast, dry, barren areas into a land of great promise with its prolific crops of natural grasses.

Queensland's Great Wealth in Natural Pastures.

The nutritive qualities of the Queensland herbage has been the cause of much astonishment to people from the South, especially those who previously only had knowledge of the soft, winter coastal grasses, and upon which alone no man would dream of expecting his horse to perform hard dray-work. Consequently they much appreciate seeing teams of both horses and bullocks, drawing heavy loads of wool from the stations to the railways, keep in wonderfully prime condition by feeding on the native grasses at night, after the day's heavy work. The general experience has been to find more nutriment in the grasses growing inland than in those flourishing in the coastal areas. Cattle, which, owing to adverse seasons, have been removed from southern parts of New South Wales and Northern Victoria, to Gippsland, have taken months to regain their condition, whereas ragged-looking cattle from Gippsland, when transferred to Northern Victoria, have become fat in a remarkably short period. The Royal National Association, in a praiseworthy manner, has set aside a small area for grass plots at the Exhibition grounds, and, with a possible extention of this reserve, in time much good is likely to result because a large number of men who are closely associated with the land are unable to distinguish good from worthless grasses.

THE 1923 SUGAR SEASON.

Due to the excellent crops in North Queensland above Townsville, and the high percentage of sugar in the cane there, the yield of sugar for the present season is now likely to be a good deal higher than was anticipated in June last. Although, due to the severe drought, most of the Southern mills have only had a short season and failed to realise their earlier estimates, the more Northern mills have been harvesting heavier crops than they at first expected, and some of these mills will have to go well into January before cutting out. From the estimates recently furnished to the Director of Sugar Experiment Stations (Mr. H. T. Easterby) by the various Queensland sugar-mills, it now appears likely that a yield of 260,000 tons of sugar may be produced, that is if the mills are able to crush all the cane they expect. This will, of course, largely depend on the remainder of the season.

This, with a production in New South Wales of, say, 17,000 tons, and in Victoria (beet) of 2,700 tons, will give a production for Australia of 279,700 tons, which should about meet the consumption if Queensland's present estimate is finally realised.

THE WELFARE OF COUNTRY WOMEN.

Points from a paper on "Women in the Tropics," read at a recent Conference at Charters Towers, under the auspices of the Queensland Country Women's Association, by Dr. Phyllis Cilento, of Townsville.

One of the great disadvantages experienced by women, especially in outlying parts, is the isolation, with the consequent feeling of mental stagnation; the lack of good books, pictures, good music, or plays; and the limited circle of friends who, though appreciated, do not afford the stimulus of a wider circle of acquaintances with a wider range of interests. In the towns, too, this is noticeable, for even a town of the size of Townsville has no public reading library where information can be obtained; no pictures or even prints of the masters, for the education of both young and old. The sense of being "out of things" and caught in a backwash of civilisation breeds more discontent and restlessness among women than even material hardship. Such discontent and restlessness militates more than any other factor against improvement in the conditions of women, and yet is a direct effect of the conditions. It results in an unwillingness to make their homes in the North, and a constant looking southwards for all good things. They consequently grumble at the inconveniences and disabilities they suffer in the North, without doing a hand's turn to improve their lot. It never will be better unless there is loyalty to the land of their birth or adoption among its women, and this is the spirit which the Country Women's Association is trying to foster. Instead of grumbling, we are trying, not to "make the best of a bad job," but to make the best of "the very splendid job" that Nature has made ready for us in North Queensland.

Needs.

Having considered these disabilities under which we suffer, I would sum up our more urgent needs to make the life of women and children in the North not only more healthy and comfortable but as attractive as the environment warrants as follows:—

1. Better housing.
2. Education in the matter of how to live in the Tropics, as regards housing, house sanitation and ventilation, labour-saving devices, domestic economy, diet, clothing, and prevention of disease.
3. More maternity hospitals or wards, with ante- and post-natal clinics, baby- and child-nursing centres; and an organised nursing system for bush districts.
4. Cheaper fares and holiday camps for families, and the opening of "hill stations" in suitable mountain sites.
5. Cheaper and more certain supply of fruit, vegetables, eggs, and milk, &c.
6. Propagation of a sense of fellowship, unity, and loyalty among all the women of the North, and through this to provide an opportunity for closer touch with the outside world.

Recommendations.

Amongst the resolutions formed at the previous conference we find many of considerable importance. Thus emphasis is placed on the increase of facilities for country women and their families to reach seaports and pleasure resorts or holiday grounds; for increased training in details of use in domestic and commercial life; increase of scholarship facilities and equal opportunities for men and for women; for the institution of cottage hospitals, maternity wards, baby clinics, creches and kindergartens, and provision of many of the things which add comfort and even luxury to life, and tend to compensate the disadvantages of pioneering. It is unnecessary to traverse the field. We are all agreed upon these essentials.

From a medical point of view, however, emphasis must be placed upon certain of their features. It is not enough that you should have proposed a system of maternity hospitals. The country women must be willing to do their part. The Government is not an inexhaustible financial mine, but the country is. If we are serious about these measures we must be prepared to back up the Government pound for pound, or in more scattered districts, £1 in £3. Further, we must be determined not to let this matter rest until country women, with the assistance of the Government, have succeeded in instituting maternity wards, wherever the population is sufficient to warrant a hospital, and must aim at Government subsidisation of all private country maternity homes, subject to there being a minimum fixed fee, a trained staff, and an agreement that procedures shall be open to Government inspection. The same thing may be said of baby clinics, both stationary and travelling, and of creches and kindergartens.

Next to suitable living conditions a place of importance must be given to facilities for rest and recreation, and in this particular more especially to rest-rooms

for women and playgrounds for children. In Port Pirie, South Australia, there was a rubbish dump known as "Jam Tin Park." Lack of facilities for children was canvassed with such efficiency and effect that the whole male population turned out en masse, and in one day transformed an eyesore into what is recognised to be one of the model playgrounds of South Australia. Country women can initiate such measures as this without appealing to Governments, and must be responsible for lack of playgrounds, if they are not willing or capable enough to enthuse their husbands and sons in this regard.

We must aim too, apart from lectures and demonstrations on housing, clothing, infant welfare, and domestic science (essential as these indeed are), at the provision of an increased number of medical officers, both male and female, for more thorough and frequent inspection of schools and school children. We must be prepared, also, not merely to clamour for increased support in this respect, but to second the willing response to their advice, by local drives, &c. These may take the form of—

1. Drives for the elimination in local areas of diseases which have assumed too great a prevalence—for example, diphtheria, typhoid, hookworm, tuberculosis.
2. Local drives for the institution of (*a*) pure water supplies; (*b*) pure milk supplies; (*c*) the destruction of insects which are disease carriers, for example, the blowfly in sheep districts and where eye diseases are prevalent, mosquitoes in localities where malaria and filaria are prominent.

These drives lie entirely within the hands of the local populations. No medical officer, however competent, however enthusiastic, however conscientious, can do anything unless he has behind him public opinion, and in the final analysis public opinion in the country is the opinion of the country women.

One recommendation is that the Government be asked to erect flyproof windows and doors in country schools, and that lectures be given on such subjects as thrift, cleanliness, and hygiene. Such lectures are of practically no use if the child leaves school to return to a home, however clean inside, the surroundings of which are breeding places of innumerable flies, and other foul-breeding and disease-bearing insects.

The Government can, and doubtless will, provide when there is a sufficient demand, competent persons to lecture and demonstrate, but there must undoubtedly be a definite demand and desire on the part of the people in general before it is likely that such an expense will be considered justifiable. In other words, the problem rests in our own hands.

We are all agreed upon the desirableness for assistance and even a programme. The Government can justifiably look to us to put into effect a very large proportion of measures which common sense tells us are necessary.

We are all agreed upon the desirability of being instructed on rational feeding, housing, clothing, sanitation, and labour-saving devices, but are we at the present juncture equally agreed that we could provide in any of the towns we represent, a packed and enthusiastic house to listen to lectures on these subjects? We personally, would perhaps be glad to have pamphlets to distribute to the women of outlying farms, but have we prepared them for the reception of these pamphlets, and if they read them would they follow the advice contained in them? Lectures, pamphlets, and demonstrations are the seeds of progress, but are we sufficiently preparing the soil? Pamphlets suggest talks, and talks suggest letters. There is no better means of getting in touch with remote settlers who so much need assistance, than by means of the book club and similar activities, which can materially assist if we want to, perhaps more easily than in any other way by the institution of a correspondence league, by which activity members living in larger centres could combat the sense of isolation of the women in outlying parts, and stimulate a feeling of fellowship between country women.

Conclusion.

In reading over the resolutions formed at previous conferences, one is struck by the last half dozen recommendations in which the Association pledges itself to do its utmost to arrange for the provision of every kind of facility for the country women. Here, where branches have just been initiated, we cannot do better, I think, than concentrate upon the things which by our very acceptance of membership we have tacitly pledged ourselves to perform. In short, let us for the present do rather than ask. Let us bend our energies rather to a generalised stocktaking of our local needs and resources and the defining of the best way we can set these resources to deal with these needs, rather than to aim at favours obtained entirely from the Government.

Sincerity, where it is rational, produces sympathy. Active sympathy immediately results in progress. With progress and strength we can ask as a right those things which we at present might somewhat vaguely crave as a privilege.

PARALYSIS OF THE HINDQUARTERS IN PIGS.

Paralysis of the hind quarters in pigs is not an uncommon complaint. It is generally considered to be a deficiency disease—that is, some element needed for nutrition is not present in the food.

In answering a question from a farmer recently, the Veterinary Department of the Colorado Agricultural College, U.S.A., stated that the substance in this particular case that was probably lacking was that which had come to be known as Vitamine BA.

A recommendation was made that the farmer try feeding a ration consisting of plenty of milk and carrots.

Results under experimental work with this ration in cases of pig paralysis have been remarkable.

The remedy is a simple one and well worth trial.—E. J. Shelton, H.D.A., Instructor in Pig-Raising.

ROUNDWORMS IN SWINE.

By JOHN LEGG, B.Sc., B.V.Sc., M.R.C.V.S., Government Veterinary Surgeon, Townsville.

The attention of the writer was recently drawn to a parasitic condition occurring in certain swine killed at the abattoirs in Townsville. The particular condition was associated with the presence of deep congestion, with occasionally ulceration of mucous membrane of the stomach, the contents of which when examined were found to contain numerous small nematode worms.

These parasites can only be discovered by a very careful and close search of the stomach contents, and when found are like small, fine red threads which move actively among the ingesta.

Specimens were collected and forwarded to Dr. Georgina Sweet, of Melbourne, and were identified as *Arduenna strongylina* and *Physocephalus sexalatus,* two members of the family Filariidæ. I am also indebted to Dr. Sweet for giving me particulars of these parasites, as they occur in other countries, as well as a complete description of their anatomy.

It is unnecessary to give a complete description of the anatomy of these parasites here, except to say that they are about $\frac{1}{4}$-$\frac{3}{4}$ inches in length, or even slightly longer. The males are smaller than the females, and can be identified by their twisted tails. *Physocephalus sexalatus* is slightly smaller than *Arduenna strongylina.*

From the literature available, the writer can find no record of these parasites as having being reported previously in pigs in Queensland; hence one reason for recording them here. The other reason is that the parasites seem to be of some economic importance. The Slaughtering Inspector at Townsville (Mr. J. A. Rheuben), to whom the writer is indebted for first drawing his attention to this condition, has informed me that the infected animals are invariably in poor condition, and his observations would seem to show that such infected animals do not seem to fatten even under the best of conditions. On examination of the stomachs, as previously mentioned, the surface of the mucous membrane is deeply congested and occasionally shows small ulcers.

These parasites, which appear to be found associated together in other parts of the world as well as here, have been reported from different countries in Europe, and from South America, but have been particularly studied in the United States of America. In the latter country the condition is found frequently associated with marked ulceration of the stomach. Ulceration is apparently not a marked feature of the disease in North Queensland.

The life history of these parasites is unknown.

The discovery of these parasites is a tribute to the energy of the Townsville Inspector of Slaughter-houses (Mr. Rheuben).

As a result of this officer's work during the last two years we have been able to record no less than four hitherto-unknown parasitic conditions of the pig in Queensland.

THE QUEENSLAND SUGAR INDUSTRY.

The Director of Sugar Experiment Stations (Mr. H. T. Easterby) who recently visited the sugar districts of Bundaberg, Mackay, Herbert River, Johnstone River, Babinda, Cairns, and Mossman, has returned to Brisbane. Mr. Easterby's visit was primarily connected with the Sugar Experiment Stations at Bundaberg, Mackay, and South Johnstone, the collection of data for the annual report, the direction of new experiments for the coming season, the securing of a revised estimate for the sugar yield of the present season, and a survey of the industry generally.

Conditions throughout the sugar districts from Bundaberg North were exceptionally dry, and in many places there was a great scarcity of grass and water.

Bundaberg looked fairly green, but crops were on the light side and mills had reduced their previous estimates. On a subsequent visit, made by the Director six weeks later on the way back to Brisbane, it was found that the crop had been even much lighter than anticipated and most of the mills had completed crushing for the season. Some good showers had been experienced, and this district was looking much greener than any sugar district in the North, although the yield of cane was very much poorer.

Herbert River District.

Only about 28 to 30 inches of rain had fallen in this area up to the middle of October. The country was very dry and dusty, but the cane crops were cutting out splendidly and giving a heavy yield. The two mills were getting through the crops rapidly and turning out large quantities of sugar for shipment south. A large area of new land was being put under cane both in the Herbert River district and also between Ingham and Rollingstone. The Colonial Sugar Refining Company evidently intend making a much larger use of Queensland molasses in future, and are erecting a large storage tank at Lucinda Point to supply molasses to their tank steamers for shipment to Sydney. The commercial cane sugar content in the cane is remarkably good on the Herbert River this year, ranging from 15 to 18 per cent. The Haughton sugar mill was taking the surplus cane from Rollingstone to Ingham, but as they only had a small crop the mill ceased operations early in October. The cane on the Herbert River was fairly healthy, but a large amount of gummed cane was visible on the Macknade side of the river, principally in the variety known as Clark's Seedling or H.Q. 426.

Cairns District.

This district was also suffering from droughty conditions, and while the cane was not so green as on the Herbert River, yet crops were cutting out well and the mills were doing good work, although large areas of burnt cane were giving trouble at Mulgrave. The young cane for next year, of which there is a great deal, was looking very fine and generally green. The commercial cane sugar in the cane now being harvested was high. Fortunately little damage had been done by grubs this year. This has been generally attributed to the abnormally dry season. The whole of the Cairns district is most prosperous, and it is apparent that a great future awaits this port.

An interesting experiment plot for testing certain diseases in cane was inspected at the Mulgrave Mill. This is in charge of the chemist, Mr. McBryde, who hopes to secure data in connection with leaf scald. Mosaic disease was noticed in a stool of Clark's Seedling on this plot, for the first time, although it is subject to gumming.

Mossman District.

The cane on this area was also cutting out well in spite of much dry weather and bush fires. Crops of B.147 at the rate of 40 tons per acre were being harvested. This district also presented a most prosperous appearance, and the mill was doing fine work, the average commercial cane sugar in the cane to date being over 15 per cent. The mill authorities are hoping to be able to extend their tramline to the Daintree River, which would add a considerable area to their existing lands. This year Mossman expects to crush 72,000 tons of cane, and new machinery has been added to the existing plant. Scarcely any disease was noticed in the cane, and there were no grubs reported this year in the district.

Babinda.

Large cane fires were breaking out at Babinda in October, and about 4,000 to 5,000 tons of cane were burnt in one fire alone. The Central mill is doing fine work and now expects to cut a much larger tonnage than estimated earlier in this year. In fact, if anticipations are realised there is every probability of this mill turning out 20,000 tons of sugar this year, which would be the largest yield of sugar

ever produced by any one mill in Queensland. The commercial cane sugar is fairly high, very much better than it was some years ago when the land was new and the cane rank. No damage from grubs has been reported. The young cane has an excellent appearance, and the outlook for next year is highly promising. It is anticipated that the mill will cut cane from 8,000 acres this year, and the manager (Mr. A. McColl) stated that a new area of 800 acres of new scrub land was being added to the mill's area.

Innisfail District.

This district, usually the wettest in Australia, was in October perhaps one of the most dusty. The majority of householders and business people were buying water for domestic use, and baths were at a premium. The rainfall from the beginning of the year had only been 78 inches, about half the average, and the condition of the grass was exceedingly dry, but as usual a comparatively dry season suits the Johnstone River, and the cane crop and sugar yield was higher this year than it has ever been previously. Goondi Mill was doing very fine work, and expected 135,000 tons of cane. Crushing at this mill was expected to terminate on the 24th of the present month. South Johnstone Mill was also doing good work, but was badly handicapped by the men refusing duty on Sundays. This was holding the mill back and shortening the weekly tonnage of cane being crushed, which was considerably less than its capacity. This may seriously affect the position towards the end of the crushing, as the South Johnstone Mill has a very large tonnage to deal with and will have to crush well into January. Many growers are uneasy as to whether they will get all their cane cut this year. A good deal of burning is also taking place.

The average commercial cane sugar in the cane at Mourilyan was 15.4 to the end of October. This mill commenced work somewhat late, due to waiting for new machinery. The improvements carried out include new carrier, new crushing mill, electric gantry, and large new sugar-store. The carrier is designed to handle cane by the tipping of the trucks on to the movable platform, and so do away with the usual machine unloaders. The management say the scheme is economical and is working satisfactorily. Altogether upwards of £50,000 had been spent last year in mill improvements, and further additions are yet to be made.

Innisfail has earned the name of the "Million-pound town," but this year if all the mills crush to their estimates the value of the sugar produced should approach £1,300,000.

Should good rains fall in the immediate future there should be a tremendous crop next season. The young cane has made a splendid strike everywhere and looks beautiful.

Tully River.

This new cane-district is presenting a scene of great activity. Farmers are busy clearing their new holdings preparatory to planting cane. A number of sales have taken place, and there is already a considerable population and four stores. The mill site is being cleared, and preparations are being made for the building of the mill's buildings. It is understood that the construction work will be in the hands of Messrs. Barbat and Sons, of Ipswich, who will act for Walkers Limited in the erection work.

Mackay District.

This district was suffering severely from the prolonged dry weather. The rainfall last year was only half the average, and has been followed by a very dry time in 1923. The crops have cut out much below the average, and small tonnages have been experienced at all the district mills. The young cane is holding out well at present, and provided good rains fall within the next month should not get very far behind. All growers are hoping earnestly for a beneficial downpour, which it is hoped will speedily come to their relief.

The sugar yield in Mackay will probably be about 34,000 tons this season. An irrigation plant is being installed by one of the leading growers.

Summary.

While all the districts south of Townsville, except Nambour, have suffered more or less severely from the extremely dry weather, and the yield of cane has been comparatively low, the districts above Townsville have experienced a splendid season, the crops of cane being high and the yield of sugar exceptionally good. Most of these Northern mills have substantially increased their estimates during the last two or three months, so that it is confidently hoped that the much larger yield in the North will make up for the deficiency in the output south of Townsville.

A revised estimate of the anticipated sugar yield for this season will be issued in a few days.

THE PURE SEEDS ACTS, 1913-1914, EXPLAINED.

By F. F. COLEMAN, Officer in Charge, Seeds, Fertilisers, and Stock Foods Investigation Branch, Department of Agriculture and Stock.

Both buyers and sellers of seeds would do well to make themselves acquainted with the Regulations now in force, which are as follows:—

1. In these Regulations, unless the context otherwise indicates, the following terms shall have the following meanings respectively:—

Definition of vendor.

(*a*) "Vendor"—Any person who sells or offers or exposes for sale, or contracts or agrees to sell or deliver any seeds.

Definition of foreign ingredients.

(*b*) "Foreign ingredients" shall include inert matter, seeds of weeds, and seeds of any kind other than the seeds in question; or dead, diseased, insect infested, non-germinable, or hard seeds.

Inert matter.

(*c*) "Inert matter"—Broken seeds less in size than one-half of a complete seed; or chaff, dust, stones, or any material other than seeds.

Hard seeds.

(*d*) "Hard seeds"—Any seeds whose seed coats are so impervious to water as to delay germination.

Invoice to be given by vendor.

2. (1) Upon the sale of any seeds of the value of not less than one shilling, the vendor shall, at the time of sale, give to the purchaser, or, if the purchaser is not personally present at the time of sale, forthwith send to him an invoice containing the statements required by the Act.

(2) Every such invoice shall specifically state that the seeds passing on such sale are for planting or sowing and the kind or kinds of such seeds, and that such seeds contain no greater proportion or amount of foreign ingredients than is prescribed with respect to that kind or those kinds of seeds, and, notwithstanding any agreement to the contrary, such invoice when received by the purchaser shall be deemed to be a description of the seeds passing on such sale so as to constitute the transaction a contract for the sale of goods by description within the meaning of "*The Sale of Goods Act of* 1896."

Seeds sold in pictorial packets, or other made up parcels.

3. All seeds sold in made-up parcels shall be clearly and indelibly marked upon the outside of each parcel with the year in which such seeds were grown.

The maxiumum amount of foreign ingredients allowed.

4. The proportion or amount of foreign ingredients which may be contained in any quantity of any kind of seed shall not exceed the proportion or amount respectively set forth in Schedules A, B, and C.

Fee for copy of certificate.

5. The fee for a copy of the result of any examination of any seeds shall be two shillings and sixpence for each sample.

Weight of samples.

6. The weights of seeds to be taken as samples for purposes of examination shall not be less than as mentioned and set forth in Schedule D.

Efficient seed-cleaning machinery.

7. The Regulations shall not apply to—

(*a*) Seeds sold by the actual grower direct to any vendor in possession of one or more efficient cleaning machines, for the purpose of the seeds being cleaned and graded before being offered for sale as seed for sowing.

(*b*) Seeds held in storage by a vendor in possession of one or more efficient cleaning machines, for the purpose of being cleaned and graded and which has not been offered, exposed, or held in possession for sale.

Calculation of percentages.

8. For the purposes of the Schedules to these Regulations, percentages shall, in respect of germinable seeds, dead and non-germinable seeds, and hard seeds, be calculated by number, and in respect of all other matters, by weight.

9. Samples of seeds for sowing sent for analysis by any person other than an officer shall not be of less weight than is prescribed by Schedule D, and in the case of seeds containing foreign ingredients double the weight mentioned shall be sent. All such samples shall be plainly written on in ink giving the following particulars:— Marking of samples and fee for analysis.

(1) Kind of seed.

(2) Quantity the sample represents.

(3) Marks on bags or grower's name.

(4) Name and address of sender.

Such samples, with covering letter enclosing the prescribed fee of 2s. 6d. for each sample, shall be addressed to the Under Secretary, Department of Agriculture, Brisbane.

10. Any person guilty of any contravention of these Regulations shall be liable to a penalty not exceeding ten pounds. Penalties.

SCHEDULE A.

FOREIGN INGREDIENTS.

Kind of Seed.	Inert Matter.	Seeds of weeds or seeds of any cultivated plant not included in Schedule A which will not pass through a metal sieve perforated with round holes 2 mm. in diameter.	Seeds of weeds which will pass through a metal sieve perforated with round holes 2 mm. in diameter.	Seeds of any cultivated plant included under Schedule A other than seeds of the kind to which the sample purports to belong.	Seeds of *Cuscuta spp.* (Dodder), *Datura spp.* (Thorn apple), *Ricinus communis* (Castor oil plant), and diseased or insect-infested seeds.	Dead and non-germinable seeds.
	Per cent.	Per cent.		Per cent.		Per cent.
Barley (*Hordeum spp.*)	2	1	Nil	2	Nil	15
Oats cultivated (*Avena spp.*)	2	1	Nil	2	Nil	20
Rye (*Secale cereale*)	2	1	Nil	2	Nil	20
Wheat (*Triticum spp.*)	2	1	Nil	2	Nil	15

Prescribed standards.

SCHEDULE B.

FOREIGN INGREDIENTS.

Kind of Seed.	Inert Matter.	Seeds of weeds or seeds of any kind other than that to which the sample purports to belong.	Seeds of *Cuscuta spp.* (Dodder), *Datura spp.* (Thorn apple), *Ricinus communis* (Castor oil plant), and diseased or insect-infested seeds.	Dead, non-germinable, and hard seeds.
	Per cent.	Per cent.		Per cent.
Cowpeas (*Vigna spp.*)	2	1	Nil	35
Lucerne (*Medicago sativa*)	2	1	Nil	35
Mauritius Bean (*Stizolobium aterrimum*)	2	1	Nil	40

Prescribed standards.

SCHEDULE C.

FOREIGN INGREDIENTS.

Prescribed standards for :—

Kind of Seed	Inert Matter.	Seeds of weeds or seeds of any kind other than that to which the sample purports to belong.	Seeds of *Cuscuta spp.* (Dodder). *Datura spp.* (Thorn apple). *Ricinus communis* (Castor oil plant), and diseased or insect-infested seeds.	Dead and non-germinable seeds.
	Per cent.	Per cent.		Per cent
Beans—				
Broad (*Vicia faba*)	2	1	Nil	25
French (*Phaseolus vulgaris*) ..	2	1	Nil	25
Lima (*Phaseolus lunatus*) ..	2	1	Nil	25
Runner (*Phaseolus multiflorus*) ..	2	1	Nil	25
Beet (*Beta sp.*)	2	1	Nil	45*
Cabbage (*Brassica oleracea capitata*) ..	2	1	Nil	35
Carrot (*Daucus carota*)	2	1	Nil	45
Cauliflower (*Brassica oleracea cauliflora*)	2	1	Nil	40
Cotton (*Gossypium hirsutum*) ..	2	1	Nil	30
Cucumber (*Cucumis sativus*)	2	1	Nil	35
Grasses—				
Canary (*Phalaris canariensis*) ..	2	1	Nil	30
Cocksfoot (*Dactylis glomerata*) ..	3	1	Nil	50
Couch grass (*Cynodon dactylon*) ..	2	1	Nil	70
Paspalum (*Paspalum dilatatum*) ..	4	1	Nil	80
Prairie grass (*Bromus unioloides*) ..	5	1	Nil	50
Rhodes grass (*Chloris gayana*) ..	6	1	Nil	70
Rye grasses (*Lolium spp.*) ..	2	1	Nil	40
Leek (*Allium porrum*)	2	1	Nil	50
Lettuce (*Lactuca sativa*)	2	1	Nil	35
Linseed (*Linum usitatissimum*) ..	2	1	Nil	25
Maize—				
Dent (*Zea Mays indentata*) ..	2	1	Nil	15
Flint (*Zea Mays indurata*) ..	2	1	Nil	15
Mangel (*Beta sp.*)	2	1	Nil	45*
Marrow (*Cucurbita pepo*)	2	1	Nil	35
Melon (*Cucumis melo*)	2	1	Nil	35
Millets—				
Foxtail—				
Hungarian, Liberty } (*Setaria italica*) ..	2	1	Nil	30
Manchurian (*Setaria italica* var. *Manchuria*)	2	1	Nil	30
Siberian (*Setaria italica* var. *rubra*)	2	1	Nil	30
Barnyard—				
Japanese Millet (*Panicum crus-galli* var. *Sativum*)	2	1	Nil	30
White Panicum (*Panicum frumentaceum*)	2	1	Nil	30
Marestail—				
Red French, White French } (*Panicum miliaceum*)	2	1	Nil	30
Cat-tail—				
Pearl (*Pennisetum glaucum*) ..	2	1	Nil	30
Mustard (*Brassica alba*)	2	1	Nil	30
Onion (*Allium cepa*)	2	1	Nil	40
Parsnip (*Pastinaca sativa*)	2	1	Nil	75
Peas (*Pisum spp.*)	2	1	Nil	25
Pumpkin (*Cucurbita spp.*)	2	1	Nil	35
Radish (*Raphanus sativus*)	2	1	Nil	35
Rape (*Brassica napus*)	2	1	Nil	30
Rice (*Oryza sativa*)	2	1	Nil	20
Sorghum (*Sorghum vulgare*)	2	1	Nil	30
Sudan grass (*Sorghum Sudanense*) ..	2	1	Nil	30
Swede (*Brassica Rutabaga*)	2	1	Nil	35
Sweet corn (*Zea saccharata*)	2	1	Nil	25
Tares (*Vicia sativa*)	2	1	Nil	25
Tobacco (*Nicotiana tabacum*)	2	1	Nil	45
Tomato (*Lycopersicum esculentum*) ..	2	1	Nil	35
Turnip (*Brassica Rapa*)	2	1	Nil	35
Watermelon (*Citrullus vulgaris*) ..	2	1	Nil	40
Agricultural and Vegetable seeds not elsewhere included	2	1	Nil	50

* Non-germinable clusters.

SCHEDULE D.

Prescribed weight of samples.

Kind of Seed.	Prescribed Weight.
Barley, Beans, Cowpeas, Maize, Oats, Peas, Rice, Rye, Tares, Wheat	8 oz.
Canary, Cotton, French Millet, Japanese Millet, Linseed, Lucerne, Prairie Grass, *Sataria italica* (Foxtail Millet), *Sorghum Sudanense* (Sudan Grass), Sorghum, White Panicum	4 oz.
Couch, Paspalum, Rhodes, and other grasses	2 oz.
Beet, Cabbage, Carrot, Onion, Parsnip, Radish, Tomato, Turnip, and Vegetable seeds of like size	½-oz.
Vegetable seeds in made-up packets	3 packets
Agricultural and Vegetable seeds other than those included above.	2 oz.

From the Regulations it will be noted that samples of seed may be sent to the Department of Agriculture for analysis. When sending such samples it is of the utmost importance that they be drawn by the sender from seeds in his actual possession, care being taken to make them truly representative of the bulk. The weight of each sample and marking required are fully explained in the Regulations. In case of any complaint regarding purity or germination, the name of the vendor and copy of the invoice received by the buyer should be sent to the Department of Agriculture in the covering letter advising of the despatch of the sample. No charge will be made to farmers sending in samples of seeds that they have purchased for their own sowing, provided the necessary particulars are plainly written thereon, and the vendor's invoice forwarded with the sample. In all other cases a charge of 2s. 6d. is made for each certificate of analysis.

FORM OF CERTIFICATE.

A certificate of analysis gives the following particulars:—

Calculated by Weight.	Calculated by Number.
Purity (Analytical) .... per cent.	Germination .... per cent.
FOREIGN INGREDIENTS.	
Inert matter .... per cent.	Hard seeds .... per cent.
Seeds of weeds or seeds of any kind* other than that to which the sample purports to belong .... per cent.	Dead and non-germinable seeds ....per cent.

*The principal seeds are (the names of the weed seeds which the sample contains and, in certain cases, the approximate number in one pound).

Unless the sender is careful to forward a truly representative sample the certificate is valueless. Under no circumstances is it a guarantee by the Department of Agriculture as to the bulk, but an analysis of the sample received, giving a plain statement of its condition at the time when such analysis was made.

''Purity'' means analytical purity, which is the percentage by weight of pure seeds that the sample contains, and the term ''Pure seeds'' means the seeds of which the sample purports to consist after the impurities or foreign ingredients, as defined in the Regulations, have been eliminated; but, in the case of those species, kinds, or strains of plants, the seeds of which cannot be distinguished from one another by expert examination, the use of the term ''purity'' does not imply that the seed is genuine or true to name.

''Germination'' means the percentage, calculated by number, of pure seeds as defined above which germinate during a germination test.

''Foreign ingredients'' are defined in the Regulations, which, it is well to note, do not prescribe the minimum percentage of germination, but the maximum percentage of foreign ingredients. The minimum percentage of germination can be ascertained by deducting the prescribed amount of dead, non-germinable, and hard seeds from 100. Example: The amount of dead, non-germinable, and hard seeds prescribed for Mauritius beans is 40 per cent.; therefore, the minimum percentage of germination is 60 per cent.

Every purchaser should know the purity and germination of the seed that he intends to buy or sow; also its freedom from diseased or insect-infested seeds. These matters can only be decided by a thorough examination of a large and truly representative sample drawn from the actual bulk in the sender's possession. Seeds constitute the most variable material that the farmer or merchant purchases, and the success or failure of a crop, or even succeeding crops, may be wholly determined by the kind or condition of the seed sown. No one can afford to leave any doubtful point to chance, and it is but common prudence to ascertain the purity and germination of all seeds purchased before sowing or offering them for resale.

Although buyers and sellers are able to form a good idea of the market value or price, experience shows that they are frequently misled as regards purity and germination. It is impossible to determine the amount of weed seeds, non-germinable seeds, hard seeds, or inert matter other than by a purity analysis and germination test conducted under uniform scientific methods. Any opinion as to the quality or condition of any agricultural seeds is useless unless based on the examination of a truly representative sample.

In buying, let quality, not price, be your guide; the best is never too good. When placing an order make it clear that you want seeds for sowing; not only obtain but keep the vendor's invoice. Examine all goods on the day of delivery; when in doubt write at once to the Department of Agriculture.

Before sending any samples, care should be taken to see that the required particulars are plainly written thereon in ink.

COVERING LETTER.—All samples, with covering letter, should be addressed to—

The Under Secretary,
Department of Agriculture and Stock,
Brisbane.

SALT POISONING IN PIGS.

By E. J. SHELTON, H.D.A., Instructor in Pig-raising.

Information was received by the writer recently of a serious loss amongst pigs in Tasmania, as a result of salt poisoning.

It appears that some time ago a steamer bound from Tasmania to the Eastern States of the mainland was partially wrecked on the cost of Tasmania close to one of the larger shipping ports. The steamer's cargo included a large quantity of barley suitable for "feed" for stock. This portion of the cargo was under water for some time before it was possible to release it, but eventually much of it was salvaged. In due course the barley was sun-dried, rebagged, and offered for sale at a very low price, which attracted pig farmers and others. Apparently nothing was said at time of sale as to the origin of the barley, and so it was utilised as a pig food by our informant. Taking a quantity home he utilised it for the purpose of "topping up" some fine stud Berkshires, which it was intended should be exhibited at a large southern show. Some bacon pigs were also fed on this grain, and to the intense surprise of the pig-breeder the pigs began to die off rapidly, exhibiting all the symptoms of poisoning. At this stage it was not suspected that the barley was at fault, nor was this found to be the case except by accidental means. The case was proved and immediately after other foods were substituted the trouble ceased. As this is an important instance of brine poisoning the information is passed on for the benefit of breeders generally.

Very cheap foods are frequently very expensive ones, and the utmost care should be observed in feeding them to stock.

Foods of this description should be fed very sparingly for a few days until their effect upon the animals is noted, and if any signs of illness become apparent the feed should be rejected immediately. Pigs require a certain very small percentage of salt in their food, but in instances like the one referred to it may be regarded as a very serious poison. Numerous instances have occurred of poisoning in pigs that have been fed on swill from restaurants into which hot water has been thrown that had been used for cooking corned beef and ham and other heavily salted provisions.

Soda water or soap powders in the water is also a very prolific cause of intestinal and gastric trouble in pigs.

FRUIT-FLY AND COLD STORAGE.

The following passages are taken from a recent report made to the Secretary for Agriculture (South Africa) by the Chief of the Division of Entomology, and published in the Journal of the Department of Agriculture, Union of South Africa, for October, 1923.

"In several seasons twelve and more years ago experimental exposures of fruit-fly infested peaches to cold storage at Capetown were made to get assurance, other than the commercial experience in shipping, that there was little or no danger of the insect reaching England alive. The results were reassuring, nearly all the larvæ being found dead in two weeks, and all at examinations at the end of the third week. Years later, in 1916, Back and Pemberton, of the U.S.A. Bureau of Entomology, published reports on similar, but more extensive and more carefully conducted, experiments at Hawaii. They arrived at the conclusion—as the outcome of many tests involving thousands of eggs, larvæ, and pupæ—that no stage of the insect could survive refrigeration for three weeks at 33 deg. to 40 deg. F., or for two weeks at 32 deg. to 33 deg. F.

"However, we have the indisputable fact that Fryer, in England, found five living larvæ in Cape peaches this year and reared two adult fruit-flies (*Ceratitis capitata*) from them. The correspondence implies that the minimum temperature of the particular ship's chamber in which the fruit was conveyed was 37 deg., and that the maximum temperature varied widely. The survival of these particular larvæ might therefore be put down to insufficient refrigeration. But some weeks earlier, living larvæ had been found in Salway peaches, packed as for export, after they had been held in cold storage at Capetown for two, three, and four weeks. Senior Entomologist Mally made the later examinations, and reported on 15th April that at the final one he had found thirty-two living maggots out of a total of seventy-one in eighteen infested fruits. In all but two of the fruits the maggots were all dead or all alive, and Mally then got the idea that survival might be associated with extra high protection afforded to particular fruits by packing material. The fruits were very heavily bedded in woodwool, 8 oz. of which were taken from a single tray. The trays each held twenty-four fruits and measured about 18 x 12 x 4 inches outside. All the fruits were equally protected by paper-wrapping, but the woodwool may be supposed to have given more protection to some than to others, and some fruits may be supposed to have chilled slower than other fruits by virtue of their position.

"Efforts to get newly plucked fruit for further experiments were in vain, but Mally continued observations on seventeen further trays of the same lot of peaches. About 7½ per cent. of the fruits were found infested as the examinations proceeded. An examination after five weeks disclosed seventeen living and fourteen dead larvæ from twelve infested fruits, and an examination after six weeks disclosed thirty-three living and sixteen dead from sixteen fruits. Moreover, seven pupæ were found at each of these two examinations, and there were indications that larvæ had emerged from four fruits and escaped. The larvæ found in any one fruit in these examinations were either all dead or all alive.

"The total number of larvæ taken from the fruits that had been refrigerated four weeks or longer was eighty-two. From them were reared twenty-eight male and twenty-nine female flies. Only one fly was reared from the fourteen puparia found in the fifth and sixth weeks. The last emergence was on 10th June, and it may safely be accepted that the remaining insects—that is, twenty-five taken out of cold storage as larvæ and thirteen taken out as puparia—are all dead.

"The temperature records of the chamber for the entire six weeks were studied by Mally. A reading is noted every two hours with apparently inconsequential exceptions. The range is from 25 to 44 deg. The mean of the readings is 33.972 deg., over half of the readings are 33 deg., and on only three days is 33 deg. not recorded. On these three days the range is 34 deg. to 39 deg.

"Hence, notwithstanding the apparently reliable findings of Back and Pemberton, Mally is accepted as having demonstrated that *C. capitata* larvæ may survive in cold storage at about 34 deg. for considerably longer than three weeks. The survival for six weeks was in even larger proportion than the survival for four weeks.

"Mally has advanced the plausible hypothesis that the larvæ that die in refrigeration such as that now concerned, are killed rather by abrupt transition from a high to a low temperature than by being kept at a low temperature. If his reasoning is correct, the complete kill in the earlier experiments at Capetown and Hawaii may be explainable on the ground that all the maggots experienced a sudden chilling. It is recalled that in the major experiments made at Capetown years ago the infested fruits were exposed in single-layer boxes without paper

wrapping and with little woodwool. In the recent experiments, as already stated, the fruits were in papers and bedded in a bulky packing of woodwool. It follows there is still a hope that refrigeration may be made thoroughly effective, and also that it is effective ordinarily.''

This demonstration that fruit-fly larvæ may live in cold storage at about 34 deg. for six weeks, and then successfully transform to flies, greatly emphasises the need for the packers of export fruit, most particularly of peaches and nectarines, to select fruit for export with extreme care to avoid the inclusion of any that have become infested by the pest. The packing of a variety from an orchard should cease at once if maggots are found to have appeared in it. Growers whose experience has taught them to expect the insect are urged to use poison bait to the very best of their ability to kill the parent flies before eggs are laid. It seems not to be generally known how extraordinarily successful in preventing attack baiting has proved with leading peach exporters of the western Cape Province. The Government inspection at the ports hereafter may be expected to be more severe than ever before; but growers will largely have only themselves to blame if their consignments are rejected for export owing to fruit-fly.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF OCTOBER, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING OCTOBER, 1923 AND 1922, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Oct.	No. of Years' Records.	Oct., 1923.	Oct., 1922.
North Coast.	In.		In.	In.
Atherton	0·98	22	0·47	0·87
Cairns	2·00	41	...	1·33
Cardwell	2·08	51	...	1·69
Cooktown	1·13	47	0·01	0·10
Herberton	0·96	36	0·18	0·58
Ingham	1·69	31	0·02	3·30
Innisfail	3·04	42	...	2·90
Mossman	3·00	15	...	1·96
Townsville	1·29	52	...	1·89
Central Coast.				
Ayr	1·02	36	0·02	0·95
Bowen	1·06	52	...	0·18
Charters Towers ...	0·71	41	0·01	0·05
Mackay	1·87	52	0·10	1·76
Proserpine	1·80	20	...	0·97
St. Lawrence ...	1·84	52	...	0·23
South Coast.				
Biggenden	2·25	24	0·51	1·22
Bundaberg	2·10	40	0·34	0·80
Brisbane	2·59	72	0·45	2·10
Childers	2·40	28	0·71	0·33
Crohamhurst ...	3·61	30	0·93	1·40
Esk	2·50	36	1·00	4·78
Gayndah	2·38	52	1·63	0·73
Gympie	2·72	53	0·76	0·50
Glasshouse Mts. ...	2·79	15	0·16	1·80
Kilkivan	2·61	44	0·79	0·18
Maryborough ...	2·69	52	0·92	0·29

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Oct.	No. of Years' Records.	Oct., 1923	Oct., 1922.
South Coast—continued:	In.		In.	In.
Nambour	3·05	27	1·13	0·49
Nanango	2·29	41	1·39	1·40
Rockhampton ...	1·87	52	0·11	2·47
Woodford	2·59	36	0·91	2·00
Darling Downs.				
Dalby	2·09	53	0·73	1·35
Emu Vale	2·28	27	0·46	1·11
Jimbour	1·85	35	1·64	1·74
Miles	1·98	38	0·97	1·64
Stanthorpe ...	2·61	50	1·14	1·55
Toowoomba ...	2·64	51	1·98	1·50
Warwick	2 35	58	1·71	1·59
Maranoa.				
Roma	1·78	49	0·80	3·40
State Farms, &c.				
Bungeworgorai ...	1·41	9	0·71	2·27
Gatton College ...	2·22	24	0·21	1·66
Gindie	1·42	24	0·65	2·15
Hermitage ...	1·97	17	1·36	1·59
Kairi	1·28	9	0·36	1·41
Sugar Experiment Station, Mackay	1·70	26	...	1·45
Warren	2·39	9	...	0·75

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for October this year, and for the same period of 1922, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Government Meteorologist.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS FOR OCTOBER, 1923.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Hedges Madge ..	Friesian	18 Aug., 1923	780	3·4	30·90	
Magnet's Leda ..	Jersey ..	18 Aug., 1923	574	4·6	30·90	
College Cobalt ..	,,	14 Sept., 1923	690	3·7	29·70	
College Grandeur	,,	11 July, 1923	450	5·5	29·10	
Prim	Friesian	4 April, 1923	810	3·1	29·10	
Miss Security ..	Ayrshire	8 June, 1923	630	3·9	28·80	
Bellona	,, ..	3 Aug., 1923	570	4·1	27·30	
College Wildflower	Jersey ..	13 Aug., 1923	540	4·3	27·00	
College Cold Iron	,,	23 April, 1923	420	5·1	25·20	
College Evening Glow	,,	5 April, 1923	390	5·2	23·70	
Lady May ..	Ayrshire	14 July, 1923	510	4·0	23·70	
College Prima Donna	Friesian	19 Mar., 1923	510	3·7	23·10	
Comedienne ..	Jersey ..	10 July, 1923	420	4·7	23·10	
Buttercup ..	Shorthorn	7 Sept., 1923	720	2·6	22·50	
Confidante ..	Ayrshire	7 Sept., 1923	540	3·6	22·50	
College Desire ..	Jersey ..	11 July, 1923	420	4·4	21·60	
Lute	Ayrshire	26 April, 1923	450	4·0	21·00	
Snowflake ..	Shorthorn	17 May, 1923	480	3·7	20·80	
Lady Loch II. ..	Ayrshire	26 April, 1923	420	3·7	20·70	
College Promise	Jersey ..	14 Aug., 1923	450	3·9	20·40	
Songstress ..	Ayrshire	22 Aug., 1923	450	3·8	20·10	

EAT MORE FRUIT—COMMONWEALTH CAMPAIGN.

The Commonwealth Government Fruit Pool is commencing an "Eat More Fruit" Campaign throughout the various States, with the object of encouraging the public to eat more canned fruits, and to dispose of the 1922-3 canned fruit-crop. The pool has acquired the whole of the crop, which comprises peaches (both clingstone and freestone), apricots and pears, and is specially reducing the price to the consumer in order to encourage sales. Choice fruit picked ripe in the orchards can grace the table now, when fresh fruit is scarce, enabling the housewife to give the family the delicious contribution that fruit makes towards better health. Health authorities, dieticians, and mothers, all recognise the necessity for the liberal use of fruits in the daily diet. The value of fruit as a balancing element and natural regulator is universally acknowledged. The pool urges that canned fruit be served in every household in some form every day. Just because fresh fruits are scarce, and very expensive now, is no reason for omitting them from their important place in the daily menu. From a patriotic standpoint the "Eat More Fruit" Campaign should be encouraged. The Commonwealth Government has come to the aid of the industry, and by taking over the whole pack of canned fruits has helped the fruitgrowers, many of them soldier settlers, to tide over their present difficulties. If three cans of fruit are eaten by each Australian in the course of the next few months, and then, afterwards, regularly each year, the domestic market will consume all Australia can produce. Calculation has shown that the Australian consumption of canned fruit is 2 lb. per head per annum—one tin of fruit each—against 7 lb. per head in America. Australians eat 100 lb. of fresh fruit to the American's 400 lb. From a health point of view, the Australian would be immensely benefited if his consumption of fruit approached that of the American, particularly as he is a record consumer of meat and tea. The Commonwealth Fruit Pool has issued to all grocers in Queensland a specially prepared booklet containing a carefully compiled set of recipes, printed on gummed paper, ready for attachment to the housewife's cookery book. If any difficulty is experienced in obtaining these, a set will be forwarded to anyone on application to the Collector of Customs, Brisbane.

SUGAR: FIELD REPORTS.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report (23rd November, 1923) from the Northern Field Assistant, Mr. E. H. Osborn:—

Herbert River.

Early in October the dry conditions experienced farther South were also in force here, but not to the same extent. Up to then, the Ingham rainfall had amounted to 31.86 in., or more than 50 per cent. short for the period under review. Creeks and rivers were very low, and pasturage had also fared badly.

Despite an abnormally dry time, it was most gratifying to learn that the company expected an increase of about 10 per cent. on its preliminary tonnage estimates for the season. This speaks well for the fertility of the Herbert River lands under dry conditions. Also, to judge by the very large quantities of sugar being sent away from each mill, the sugar content must be high.

Some good plant and ratoon cane was seen in various places; although backward in growth, most of it was fairly green looking, and well cultivated, and only wanted good weather conditions to make sure of a heavy crop for 1924.

Diseases.—Just now the district is suffering rather badly from gum. This is very prevalent in H.Q. 426 (Clarke's Seedling), although Badila and H.Q. 409 have also been affected to a slight extent. In the Macknade area cane, particularly H.Q. 426, has been badly affected. Nearly all classes of cane are suffering. In a plant Badila paddock where misses were supplied with H.Q. 426, these latter, although cutting well, were very gummy.

The company always condemned such practices as likely to affect the surrounding Badila. Another factor which probably helped the disease to spread was the planting of the whole stick of cane in the drills, afterwards chopping same into sets with cane knives. This practice is carried out more on the Herbert than in any other district.

Probably the dry weather has helped the disease to show up more markedly this year, but the fact remains that it is essential for every grower to help the company to rid the district of such a disease.

Another disease observed was leaf scald. This was found in H.Q. 426, Badila, Korpi, B. 208, M.Q. 1, M.Q. 2, and M.Q. 5; the three Mossman seedlings being introduced from Mossman by the company in, I think, 1921, but only grown in their nursery. Just at this period of the year it is somewhat hard to definitely diagnose leaf scald, but any suspicious looking stools should be destroyed and burnt off.

Grubs and Borers.—The former caused less damage than in late years, and the latter are not quite as bad as in previous years. At Macknade the company have now three breeding cages for Tachinid flies, and are liberating them in small blocks of standover cane left for the purpose.

Cane Varieties.—N.G. 15 (Badila), H.Q. 426, H.Q. 409, Korpi, Nanemo, and Orambo are the principal canes grown upon the Herbert. H.Q. 409 has cut very well indeed this season and has proved a rather quicker striker than in past years. One block planted last August (1923) after only two ploughings had an excellent strike. With this cane it appears that it wants either a very early or a late planting, and with only a light covering of soil. Korpi, Nanemo, and Orambo are also very good canes of good sugar content and fair tonnage.

Of canes from the Experiment Station E.K. 28 and Q. 813 are so far easily the best, and should give good tonnage and density returns in poor to medium soils. Those growers who have had experience of Q. 813 are so far very pleased with it.

Mr. A. Blackburn had just finished harvesting a block of first ratoons consisting of Q. 813, H.Q. 409, and Badila. As a plant crop the Q. 813 easily beat the other two canes for tonnage, and has again done so in the ratoons. Early in the year Mr. Blackburn planted some 13 acres of Q. 813, besides a large acreage of other varieties.

The Q. 813 was the only cane that never missed, and at time of my recent visit looked very well, comparing very favourably with cane seen elsewhere. Quite a number of other growers are now trying plots of this cane.

Innisfail District—Goondi.

Earlier estimates had been increased, and the mill was doing some splendid work—one week's crushing representing 6,013 tons of cane, probably an Australian record for one week. Nearly all the cane grown upon Goondi is Badila. Mr. C. McGowan, of Daradgee, harvested early in the season a 12-acre block off medium soil. It consisted of 3 acres each of E.K. 1, E.K. 28, and H.Q. 458, and another

3 acres of mixed canes. This block had about 2 cwt. of manure per acre applied, and cut at the rate of 42 tons per acre, although previously 26 tons to the acre was its highest yield. The cane was cut early under very cold conditions, consequently the ratoons are light.

Mourilyan.

This mill, although starting late, anticipates a very heavy tonnage. Up to time of visit the density has been very high; for that week the average was 15.8, worth £2 14s. 6d. per ton, taking some 6½ tons cane to 1 ton of sugar.

As in other parts of the Innisfail area, the cane looked remarkably well, although of course wanting rain badly. Most of the farms visited were very well cultivated, and a large quantity of manuring had been carried out. Mr. J. McCutcheon, of Liverpool Creek, recently cut a crop of fourth ratoon Badila returning 36 tons per acre. It had been manured with 8 cwt. of manure per acre, and had been deeply skeleton ploughed between the rows four times. As a third ratoon crop he manured one-half of the block only, and the returns were 25 tons per acre for the whole block. Fifth ratoons also looked very well. Mr. McCutcheon is a believer in ploughing in beans and also in skeleton ploughing, and his results certainly justify his faith. Near by his farm a 20-acre block of August plant Badila, belonging to Mr. F. R. Gill, looked healthy and green.

Nearer Mourilyan, Mr. M. Schilling was very pleased with a block of Q. 813. This only had two ploughings, in old and medium ground, and was cut at eleven months old, yielding 25 tons per acre, and giving an average c.c.s. of well over 15. His average for one day's delivery was 15.65 c.c.s., when the mill's average in Badila was 14.5. Quite a number of Mourilyan farmers have obtained plants from Mr. Schilling.

Diseases.—Leaf scald symptoms were seen in various scattered places, but, so far, in nearly all cases only single shoots seemed affected. Mosaic was also noticed in several places in H. 109.

Grubs and Borers.—Very little damage has been caused by the former in either of the areas under review, and the latter, although quite bad enough in a few places, do not seem to be as evident as in former years.

At Goondi it is understood the company proposes to breed Tachinid flies for liberation.

CHARCOAL FOR PIGS—AN AID TO DIGESTION.

At this season of the year, when there is generally a Spring or a Christmas-New Year cleaning (so called) of the barns and corn cribs in preparation for the New Year and Autumn crops of corn, many pig pens and paddocks and the barns generally will be found littered with corn cores and old husks and cobs. If left lying about these will rot and form a breeding ground for disease germs of every description, besides giving the place an untidy and an insanitary appearance. Charcoal is one of the best agents that we possess for absorbing gases and acids formed in the process of digestion. In thus assisting in the digestive process it plays a most important part, as if the food passes freely through the intestines and absorption of the digestible nutrients proceeds rapidly, the growth and development of disease-producing germs are checked.

The careful farmer, therefore, should see to it that all these corn cores, husks, &c., are raked up on a bright, breezy day and are burnt until they are in a charred condition, when clean water should be sprayed over the pile to stop the burning, or the pile may be covered with clean earth, wood ashes, or wet bags. Some farmers sprinkle the pile with coarse salt before applying the water, and this is an advantage if a light sprinkling of salt only is made.

Old and young pigs will visit the heaps whenever they have the chance, and will not let it alone until every particle of charred cobs has disappeared. Pigs two or three weeks old will be found picking out small pieces, whilst older pigs will go off with a mouthful of the larger pieces. Let the pigs eat the burnt cobs instead of trampling them over or allowing them to rot on the ground, and the results will be found to be entirely satisfactory.

Clean up your pig pen and yards and give the pigs a chance to sleep in dustless, cobless pens or houses. Do not forget that cleanliness is next to godliness in the piggery as well as in other places.

The pig truly is a wonderful scavenger. He has been described as the housewife's most wholesome sink.—E. J. Shelton, H.D.A.

CANE PEST COMBAT AND CONTROL.

Mr. Edmund Jarvis, Entomologist in Charge, Bureau of Sugar Experiment Stations, has forwarded the following report to the Director (Mr. H. T. Easterby):—

Parasites of Cane-borer Beetle.

The activity of this important branch of control work is being continued, and at the present time Tachinid parasites of the weevil-borer are freely emerging at our laboratory.

Since reporting last month additional liberations of this useful parasite have been effected in the South Johnstone area, where the borer pest appears just now to merit special attention.

On 18th October two boxes containing fly-infested cane-sticks taken from a breeding case were established on selections situated near No. 2 Branch of the main tramline.

This work was carried out by one of my assistants, Mr G. Bates, who at present is being trained here in this particular line of control, which includes the breeding, handling, transportal, and liberation of the well-known Tachinid fly (*Ceromasia sphenophori*).

Boxes of parasites set up in the field among borer-infested cane are made to hold from six to eight sticks, 2 ft. 6 in. long, containing pupæ of the parasite from which flies are just about to emerge. Each of these canes harbour from 10 to 20 fly pupæ, so that about 100 flies may be expected to issue from a box containing eight sticks. The four legs supporting one of these boxes are stood in tins of water to prevent invasion from ants, and the parasites simply escape through a few narrow slits left for that purpose when nailing on the cover. After emerging naturally in this manner they fly off the box, and finding themselves in the immediate vicinity of their host, are able to at once commence the useful work of parasitising the borer grubs.

On 31st October Mr. Bates established three additional cages in the Silkwood and Japoon areas; and also liberated 73 specimens of the Tachinid fly, which were transported alive in glass tubes and let go on three different selections in the mill area, and at No. 1 Branch.

These parasites will be emerging daily at the laboratory during the next couple of months, and canegrowers desiring to obtain specimens are asked to apply to the Entomologist at Meringa.

Parasites will be liberated free of any charge to those who will agree to leave uncut about a quarter of an acre of borer-infested cane for the flies to breed in.

Para-dichlor. as a Deterrent.

Experiments with the above fumigant this season were commenced on 9th November, with the object, in the first place, of testing its possibilities as a deterrent against oviposition.

Beetles will appear on the wing directly the ground becomes moist enough for them to escape from the pupal cells.

After copulation they will resort to feeding-trees, and not start to lay eggs until two or three weeks later.

Para-dichlor. is best applied either before or just after emergence of the beetles. If injected about a week after their appearance the soil would have ample time in which to become impregnated with the odour of this fumigant before invasion of a plantation by egg-laden females.

Ground so treated would possess strong deterrent properties, and beetles could not remain alive in it for more than a few minutes, so that any chancing to enter the soil would be compelled to hastily decamp. As a matter of fact, they would doubtless at once detect the odour on the surface-soil and be effectually repelled.

Thus in normal seasons the work of injecting could, if desired, be commenced in November, while the cane is quite small, as greybacks usually appear about the middle of that month, and the odour of para-dichlor. endures in the soil for a period of about eight weeks.

In the event of such work being delayed until December or January, any late eggs, together with first and second stage grubs, would be destroyed before the cane had been materially damaged.

Experimentation last season demonstrated that ¼ oz. injections of para-dichlor. will effect impregnation of the soil a fortnight after application, continuing repellant during a period of at least ten weeks. Now, we may safely assume, from data already obtained by laboratory and field experiments, that ¼ oz. injections put in about the middle of January would by the end of that month have killed all grubs present in the soil, and thus effected the desired control of this pest.

Such result could, as mentioned last month, probably be obtained by evaporation of only 1/24th of an ounce—viz., one-sixth of the ¼ oz. injection. It follows, therefore, that a similar mortality could be secured from ⅛ or perhaps 1/16th oz. injections, seeing that the odour arising from these doses of para-dichlor. would effect impregnation of the soil during a period of from three to six weeks.

Experiment plots will be planned this season to determine the minimum quantity of the fumigant required per acre for effective treatment of the grubs.

Last season's experiments worked out at from 1¼ to 2½ cwt. per acre, but I hope to be able to reduce this amount to 90 lb. or even less, which would bring the cost of material below that of carbon bisulphide or other fumigant.

The best time to apply para-dichlor. is when the soil is in a moist condition, but at the same time open for such fumigation.

Experiment plots just started at Meringa and Kamma were treated with ⅛ oz. injections, which in the event of beetles emerging before the end of November should prove an effective deterrent against oviposition.

Carbon Bisulphide Kills Cane-beetles in Pupal Cells.

An experiment was carried out on 30th October to determine the effect of fumigation of the soil on beetles of *Lepidoderma albohirtum* lying in cells at depths of from 10 to 18 in. below the surface. The plot selected consisted of a piece of land 3 ft. 4 in. by 2 ft. 6 in., situated on red volcanic highland, ploughed about 5 in. deep, and directly over a line of stools that had been attacked by grubs last season. This was treated with ½ oz. injections of carbon bisulphide, administered on both sides of the row, 15 in. apart, 6 in. from centre of stools, and 8 in. deep.

When examined twenty-one hours after treatment the plot was found to contain six beetles of *albohirtum*, all of which were quite dead.

Three of these were lying at a depth of 10 in., and the remainder at 12, 16, and 18 in. below the surface. The one killed at 18 in. was situated directly under an injection, those at 12 and 16 in. were situated 4 and 6 in. laterally from points of injection, while the three beetles at 10 in. deep were all lying about 6 in. from points of fumigation.

A single stool was then treated on four sides with ¼ oz. doses, and when examined twenty-four hours later three beetles were found under it.

Two of these, located at depths of 10 and 16 in., were dead, and the third, lying 18 in. from the surface, was alive and just under the centre of the stool.

This work of injecting and examination was carried out by Mr. H. Knust. The top soil at the time was very dry and in favourable condition for such fumigation, the ground, however, being moist below a depth of about 9 in. from the surface.

The data obtained indicate that fumes of bisulphide are able to penetrate the walls of the pupal cells of this destructive beetle; and that such fumigation could, if desired, be made use of on infested areas of cane land to destroy these beetles before they are able to emerge from the soil.

Tineid Moth-Borer of Sugar-cane.

The discovery of this seemingly insignificant moth-borer was made by the present writer in November, 1919, when it was bred for the first time from young ratoons collected at Meringa, Kamma, and Pyramid.

A full account, accompanied by illustrations of the life-cycle stages of this pest, was published during 1921 in Bulletin No. 11 of our Division of Entomology. Its free occurrence this season at Banna has enabled us to breed more than 300 specimens of this moth from ratoons collected by Mr. W. C. Dormer towards the end of October.

Specimens of an hymenopterous parasite of this moth have also been obtained, and possibly additional insect enemies may be bred later on.

ABSTRACTS AND REVIEWS.

All foreign agricultural intelligence in this Section, unless otherwise stated, is taken from the *International Review of the Science and Practice of Agriculture*, published at Rome by the International Institute of Agriculture.

The Genetics of Jacob.

R. E. STONE, Department of Botany, Ontario Agricultural College, "Journal of Heredity," August, 1923.

The science of genetics is twenty-one years old, but the foundations upon which genetics rests are very old indeed. The very beginnings are prehistorical, and enough information on heredity was early acquired to give rise to certain systems of selection in animal breeding.

Jacob, for example, was able to mulct his father-in-law through a definite system of selection and mating. That Jacob was in advance of many in his time there is little doubt, and also there is little doubt that he did not care to have his associates learn the secret of his success. He was, throughout his whole life, mainly concerned with the advancement of Jacob and Jacob only. Although we may agree that this son of the chosen people was a consummate rogue, we often do him injustice on the score of knowledge.

In the book of Genesis xxx., 27-42, there is set forth in detail a system which Jacob is supposed to have used in order to influence the colour of his flock. This passage is often cited to show that Jacob believed in the efficacy of maternal impressions. A careful reading of the chapter shows that he realised the importance of segregation, as he put three days journey between his spotted herd and the flocks of Laban. Furthermore, this account has been written by an observer not concerned in the material aspect. We get a clearer understanding of Jacob's notions concerning breeding if we read Genesis xxxi., 8-14, which purports to be Jacob's own account of his procedure:—

> "If he (Laban) said thus. The speckled shall be thy wages; then all the cattle bare speckled; and if he said thus. The ring-straked shall be thy hire; then bare all the cattle ring-straked. Thus God hath taken away the cattle of your father and given them to me, and it came to pass at the time that the cattle conceived, that I lifted up mine eyes, and saw in a dream, and *behold* the *rams which leaped upon* the *cattle were ring-straked*, and *speckled*, and *grizzled*. And the angel of God spoke to me in a dream saying, 'Jacob,' and I answered, 'Here am I.' And he said, 'Lift up now thine eyes and see, all the *rams* which *leap* upon the *cattle* are *ring-straked*, *speckled*, and *grizzled*, for I have seen all that Laban doth unto thee.' "

Jacob had been "stung" in his first contract with Laban. He had laboured fourteen years to make good his slip and all this time had been trying to devise a means whereby to provide for his family. As a result of long brooding while tending his herds his "inspiration" came in a dream:—Mixed breeding and isolation. To how many scientific men has the solution of a difficult problem come in the same way?

Taking the two chapters together it would seem that Jacob had observed the results of cross-breeding, and probably also observed what took place when both parents were of the same type. Of course, we cannot now make a genetic analysis of Laban's cattle, but if "ring-straked, speckled, and grizzled" are assumed to be dominant characters, we must recognise that Jacob's breeding methods were not based altogether on superstition. He realised the value of isolation and had some knowledge of the importance of giving the get an opportunity to develop under the most favourable conditions. Since the modern breeder makes use of the same principles it indicates that the art of breeding was fairly well advanced at that early period.—1746 (?) B.C.

The Power of Pedigree.

"Live Stock Journal" (U.K.).

Pedigree is always a means to an end. Its influence may be good or bad. It is not the fault of the pedigree as a system, but of those who make use of it. It has been by the power of pedigree rightly used that we own the best herds and flocks in the world, but all the same it is equally possible to use pedigree wrongly, and by breeding from bad stock on pedigree lines to perpetuate and increase bad qualities and characteristics. It is to pedigree alone that we can look for a succession of good qualities, for no matter how charming in looks two common-bred parents may be,

mated together no one can tell what the progeny will be. The only safe method to pursue in breeding is upon pedigree lines, and, in cross-breeding, by the use of pedigree sires and dams, either of pure blood or got by pedigree sires. It is the only means whereby we can keep up the standard of our live stock and bring about those improvements and characteristics which are necessary and desirable as time goes on.

Sheep and Lamb-raising—Cross-breeding Experiments.

"Journal of Agriculture," South Australia, October, 1923.

Interesting particulars relating to the sheep and lamb raising experiments conducted at Roseworthy Agricultural College. The lambs sired by the mutton breeds (the shortwools) have matured much more rapidly, showing a greater increase in weight per day than those sired by the longwools, even the slowest maturing, the Southdown, being ahead of any of the half-bred longwool lambs. The half-bred English Leicester lamb has shown the greatest weight and increase per day in its class, whilst the Shropshire is at present ahead of the Dorset Horn. However, during the fortnight between the twelfth and fourteenth week the latter were increasing at the rate of .67 lb. per day, as against .59 lb. for the former. It would appear, therefore, as if the Dorset Horn will later on outrival the Shropshire. The Southdown rams left the highest percentage of lambs, but were little inferior to the Dorset Horns. From the half-bred longwool ewes the highest average weight of fleece was obtained from the Lincoln-merino ewe, followed by the Border Leicester-merino, while the Romney Marsh-merino and the English Leicester-merino were approximately equal.

The report goes on to state that as the tests have been carried out over such a limited period—two seasons—no definite conclusions can be given, but the results so far obtained tend to indicate:—That the Shropshire is the most profitable ram with which to mate the merino ewe, although the progeny of the English Leicester and Dorset Horn are but little inferior; that the Border Leicester-merino is the most profitable of the half-bred longwool merino ewes under test; that when mated with half-bred longwool merino ewes the Dorset Horn ram produces the earliest maturing and most remunerative lamb at local values.

The Freezing Temperatures of Some Fruit, Vegetables, and Cut Flowers.

WRIGHT, R. C., and TAYLOR, G. F. (Office of Horticultural and Pomological Investigations, Bureau of Plant Industry), United States Department of Agriculture, Bulletin No. 1133, pp. 1-8 Washington, D.C. 1923.

Determinations of the freezing points of a number of fruits and vegetables have been made by the Bureau of Plant Industry in compliance with the ever-increasing demands of trade and shipping.

Determinations were made as follows:—Apples: average 28.48 deg. F.; bananas: (green) peel 29.84, pulp 30.22, (ripe) 29.36, pulp peel 20.6, blackberries 29.15, cherries 27.81, cranberries 26.7, currants 30.21, gooseberries 28.91, grapefruit 28.36, grapes 28.16, loganberries 29.51, oranges 28.03, peaches 29.4, pears (hard-ripe) 28.46, (soft-ripe) 27.83, persimmons 28.33, plums 28.53, raspberries 30.41, strawberries 29.93.

Vegetables: Average for beans (snap) 29.74, cabbage 31.18, carrots 29.57, cauliflower 30.08, egg plant 30.41, kohl rabi 30.02, lettuce 31.2, onions (dry) 30.09, peas (green) 30.03, potatoes 28.92, sweet corn 28.95, sweet potatoes 28.44, turnips 30.23.

Cut Flowers: Petals and leaves of lilies, peonies, and roses from 27 to 31.

The Mosquito-Destroying Power of Algæ belonging to the Genus Chara.

Pardo, L. Observaciones acerca de la acción de la *Chara* sobre las larvas de los mosquitos. *Boletin de la Real Sociedad espanola de Historia natural*, Vol. XXIII., No. 3, pp. 154-157. Madrid, 1923.

As a result of his study of Prof. Caballero's work (1919) on the effect of *Chara fœtida* upon the larvæ of the genera *Stegomyia, Culex,* and *Anopheles,* the author was induced to visit the swamp zone of Onteniente (Valencia). Here he found, in close proximity to ponds swarming with mosquito larvæ, a single large pool which, although the water was very rarely renewed, proved entirely free from these pests. The bottom of the pool was thickly covered with *Chara hispida*, a plant that, as Prof. Morote has also discovered, differs from other kinds of *Chara* in being able to thrive at a depth of over 3 m, which is a matter of great importance when it is necessary to destroy larvæ in very deep water. These observations were completed by laboratory experiments. Some specimens of *Chara hispida* were planted

at the bottom of a large glass jar, into which, as soon as the plants had grown strongly (26th July), six *Stegomyia* larvæ were introduced. Three of these insects died after two days, two succumbed on the third day, and the last on the fourth day. Three of the strongest *Stegomyia* larvæ (which were shortly about to pupate) were left in the glass jar which served as a vivarium for the mosquitoes, and some *Chara* plants were introduced. Three days later two of the larvæ died, and the next day the survivor perished. In similar experiments conducted by Prof. Caballero with *Chara fœtida* the larvæ did not die so soon, nor were they all killed. It would therefore appear that the larvicidal action of *C. hispida* is stronger than that of *C. fœtida.*

The author described in conclusion various observations made in the Botanic Gardens of Madrid which confirm the preceding statements. He further draws attention to the fact that the hemp retting-ponds in the neighbourhood of Valencia contain a thick growth of *C. hispida* and are entirely free from mosquito larvæ.

Modern Seed Testing : The New Zealand Official Seed Station.

FOY, N. R. (Biological Laboratory, Wellington.) "The New Zealand Journal of Agriculture, Vol. 26, No. 2, pp. 65-72. Wellington, 1923.

The author mentions the work carried out at the principal seed stations throughout the world, with special reference to the two leading stations at Zurich and Copenhagen. This is followed by a detailed description of the system adopted in New Zealand by the Official Seed Station in collaboration with the Biological Laboratory of the Department of Agriculture. Two recognised methods have been tried, the Continental and the Irish, but up to the present the latter method has been found more economical and practicable.

Germination tests are made in three specially constructed germinators—(1) The all-metal water bath type (enclosed on all sides by a water jacket), used for the testing of more difficult seeds such as rye grass, cocksfoot, dogstail, and fescue; (2) the glass wooden-frame type, for all clovers, cruciferæ, cereals, peas, and vegetables; (3) the small water bath type, for paspalum, Poa species, &c., where a high temperature is required. With the exception of paspalum and Poa species (95 degrees to 65 degrees F.), cereals at ordinary room temperatures, and peas 75 degrees to 60 degrees F., all seeds are germinated at a temperature from 85 degrees to 65 degrees F., subsequently rising to 85 degrees for eight hours, and then the temperature is lowered to 65 degrees for the remaining sixteen hours.

Peas and beans are soaked in water for sixteen hours before placing in the germinator, damp sawdust being used for the beans. Four counts are made of each sample. The intervals allowed vary according to the class of seed under test. The number germinated is entered on the record card.

In the purity analysis the percentage of extraneous seeds is given by weight.

After the second germination count a report is forwarded to the sender of the seeds, stating the average germination after a specified number of days and the percentage of impurities. This facilitates discrimination as to the ultimate value of the species, and the interim report also gives a good indication of the vitality of the type. The final report at the close of the testing period registers the intermediate and final germination, each after a certain fixed number of days, and in the case of purity tests the percentage of extraneous seeds and a complete list of the impurities.

Any peculiarity noted about the sample, such as the presence of mites, &c., is also reported. Allowances are also made for hard seed coats common with clover seeds.

In addition to germination and purity tests, research is being made relative to seed storage, loss of vitality, and improved methods of testing.

Forage Plants for Dairy Cattle in New South Wales.

HAYWOOD, A. H. (Manager, Wollongbar Experiment Farm). "Dairying under North Coast Conditions." The Agricultural Gazette of New South Wales, Vol. XXXIV., Part 1, pp. 41-48. Sydney, 1923.

The information given in this article is based upon experiments made at the Agricultural Station at Wollongbar. The author recommends the following forage plants for dairy cattle, cultivated under conditions of drought such as are met with on the northern coast of New South Wales.

Paspalum repens grows luxuriantly in summer, but towards the end of that season it seeds and quickly loses its nutritive properties. Further, after some years the ground on which this crop has been grown becomes covered with roots that prevent the air having access to the soil and cause the loss of much rain-water.

In order to remedy this difficulty the author recommends that the crop be ploughed in, so that it may rapidly decompose, after which a strong growing plant that will exterminate *P. repens* must be sown. *Sorghum halepense* is very suitable for the purpose. After a second crop has been grown the ground may be again sown with *P. repens*.

In addition to *S. halepense*, which is very well adapted for the first crop, there are other plants that can be used, such as Elephant Grass (*Typha elephantina*), Guinea Grass (*Panicum maximum*), piassava (*Attalea funifera*) and Kikuyu Grass (*Pennisetum clandestinum*), all of which are equally suitable. They make a good change of fodder for stock, which eat them with avidity.

The pastures should be divided into enclosures so that green food can be provided for the animals at almost every season of the year. This subdivision of the ground would also encourage the growth of white clover (*Trifolium repens*), which is apparently the only plant able to live in company with paspalum. When several small enclosures are available the cattle can be turned into one to keep down the paspalum, which may be cut in another by means of a reaper and removed, thus giving the white clover a better chance to grow. *Paspalum repens* can be made into silage, but it has little nutritive value and must be fed with concentrates. It makes an excellent litter. Among the various grasses that can be used the author recommends *Dactylis glomerata* (Cocksfoot grass), *Bromus ciliatus*, and *Agropyrum repens* (couch grass). These grasses supply a large amount of nutritious, appetising food during the two or three years before *Paspalum repens* has taken possession of the ground. They also make excellent winter fodder.

Rhodes Grass (*Chloris Gayana*) is another very useful plant; but it must be prevented from growing too rank, otherwise it becomes tough and unpalatable to the cattle. This applies also to Guinea Grass (*Panicum maximum*), which makes excellent fodder and yields sometimes as much as 40 tons per acre. The native blue couch grass (*Agropyrum*) has always been valued as a stock feed and also on account of its resistance to long periods of drought.

Para Grass (*Panicum molle*) makes good hay and stands trampling and frequent grazing. Other grasses also mentioned by the author in this connection are: Kikuyu Grass (*Pennisetum clandestinum*), which must be kept closely grazed, and Elephant Grass (*Typha elephantina*).

For a farm of 100 acres the author suggests the following fodder plants being sown on an area of 20 acres:—

Maize, 5 acres; *sorghum halepense*, 5 acres; cow cane (*Saccharum officinarum*), 5 acres; wheat, 3 acres; sweet potatoes, 2 acres. Total, 20 acres.

The Cinematograph in the Country Districts of France.

From the funds set apart by the law of 5th August, 1920, for the purpose of agricultural instruction, the French Ministry of Agriculture is able to make grants for the construction or purchase of films of agricultural interest, or for the installation and working, in the rural communes or institutes for agricultural instruction coming under the law of 2nd August, 1918, of cinematograph apparatus, whether fixed or movable, intended for the popularisation of knowledge useful to agriculture, or for agricultural propaganda. ("La Vie Agricole et Rurale," 14th April, 1923.)

Teaching by Means of the Cinematograph in France.

At the present time it is possible for the sum of 1,500 to 2,500 francs to purchase a lantern for schools or small halls capable of throwing the image on a screen 2 to 2.5 meters wide, sufficient for a hall containing 200 or 300 people. The price of hiring educational and agricultural films at the present time is 4 centimes per metre and representation, or 10 centimes a metre per week. Hence the hire of a film of 100 to 200 metres, that takes five to ten minutes to show on the screen, is 4 to 8 francs for one representation and 10 to 20 francs for one week. The following are the titles of some of Messrs. Pathe and Gaumont's films:—The Crossing of Wheat; Mimicry; Karyokinesis in a Living Cell; The Germination of a Pollen Grain; The Vintage, &c. ("Revue de Viticulture," 1st March, 1923.)

Cotton Research and Teaching Institute in the Transvaal.

The Transvaal University proposes to found an Institute for Cotton Research to work in collaboration with the Department of Agriculture, Tobacco, and Cotton Division. Amongst other questions studied there will be the control of the plant and animal parasites of cotton, the formation of standards, the length and tenacity of the lint, the spinning quality of South African cotton, and the general development of the cotton industry. (Journal of the Department of Agriculture, Union of South Africa, vol. 6, No. 2, 1923.)

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1923.	October.		November.		December.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	5 34	5 50	5·4	6·8	4·51	6·31
2	5·33	5 50	5 3	6·9	4 51	6·32
3	5·32	5 51	5·2	6·10	4 51	6·33
4	5·31	5 51	5·1	6·11	4·50	6 34
5	5 30	5·52	5 0	6 12	4·50	6 35
6	5 29	5 52	5·0	6·13	4·50	6·36
7	5 28	5·53	4 59	6·13	4·50	6 36
8	5 27	5 53	4 59	6 14	4 50	6 37
9	5 25	5·54	4 58	6 14	4 51	6 37
10	5 24	5·54	4 57	6·15	4 51	6·38
11	5·23	5·55	4·57	6·16	4 51	6 39
12	5·22	5·55	4 56	6·17	4·52	6 39
13	5·21	5 56	4·56	6·18	4 52	6·40
14	5·20	5·56	4·55	6·18	4·52	6 40
15	5·19	5 57	4 55	6·19	4 53	6·41
16	5·17	5·58	4 54	6 20	4 53	6·41
17	5 16	5 58	4·54	6·20	4 53	6·42
18	5·15	5 59	4·53	6 21	4·54	6 42
19	5·14	6 0	4·53	6·22	4 54	6·43
20	5·13	6 1	4 52	6·23	4·55	6·43
21	5·12	6 1	4·52	6·24	4 55	6·44
22	5·11	6 2	4 52	6·25	4·56	6·45
23	5·10	6 3	4·52	6 25	4·56	6 45
24	5·9	6·3	4 52	6·26	4·57	6·46
25	5 9	6·4	4 51	6·27	4·57	6·46
26	5·8	6·4	4·51	6·28	4·58	6·47
27	5·7	6·5	4 51	6·28	4·58	6·47
28	5·7	6·5	4 51	6 29	4·59	6·48
29	5 6	6 6	4·51	6·30	5·0	6·48
30	5 6	6 7	4 51	6·31	5·0	6·49
31	5·5	6·7	...	...	5·1	6·49

PHASES OF THE MOON, OCCULTATIONS, &c.

3 Oct.	☽	Last Quarter	3 29 p.m.
10 ,,	●	New Moon	4 5 p.m.
17 ,,	☾	First Quarter	6 54 a.m.
25 ,,	○	Full Moon	4 26 a.m.

Perigee Oct. 11th at 1·42 p.m.
Apogee Oct. 26th at 12·36 p.m.

The moon will be apparently very close to the planet Mars on the 9th at 4·49 a.m., just before sunrise. About seven hours later the moon will be in conjunction with the planet Mercury. Shortly afterwards Venus and Saturn will be in conjunction at 3·47 p.m. On the 17th at 9 p.m. Saturn will be in conjunction with the sun.

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2 Nov.	☽	Last Quarter	6 49 a.m.
9 ,,	●	New Moon	1 27 a.m.
15 ,,	☾	First Quarter	7 41 p.m.
23 ,,	○	Full Moon	10 58 p.m.

Perigee 9th Nov. at 1 a.m.
Apogee 22nd Nov. at 12·54 p.m.

Neptune will be in conjunction with the moon on the 3rd at 5·47 a.m. Venus and Jupiter will be in conjunction on the 5th at 6·11 a.m about 15 degrees east of the sun and setting about an hour later than it. Mercury will be in superior conjunction with the sun on the 16th at 10 a.m., passing it on the far side from west to east. It will be in conjunction with Jupiter on the 20th at 3·53 p.m.

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8 Dec.	●	New Moon	11 30 a.m.
15 ,,	☾	First Quarter	12 38 p m.
23 ,,	○	Full Moon	5 33 p.m.
31 ,,	☽	Last Quarter	7 7 a.m.

Perigee 7th Dec. at 1 p.m.
Apogee 19th Dec. at 9·12 p.m.

The planets Mars and Saturn will be in conjunction but apparently separated by three diameters of the moon on the 2nd at 5·42 p.m. Saturn will be in conjunction with the moon but more than three diameters above it at 9 a.m. on the 5th. About two and a-half hours later Mars will be in conjunction with the moon but a good deal further above it. Mercury will be at its farthest distance east of the sun on the 28th at 2 a.m., setting about an hour and a-half after it.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

WATER CONSERVATION IN QUEENSLAND.

THE WORK OF THE IRRIGATION COMMISSION.

The Irrigation Act of 1922, a measure designed on broad lines and suited to modern conditions, became operative in October last year and the First Annual Report of the Commission administering the Act is now available.

It is obvious that, whilst already large sums have been expended by Queensland Governments in bores and water facilities, still larger expenditure is essential in order to cope with the requirements of extensive settlement projects now developing, and to more effectively serve areas already settled.

The Commission proposes to organise the State into water districts and facilitate the conservation of water by Boards, Trusts, Groups, and individual settlers.

Financial considerations, however, preclude any immediate general scheme of operations, but it is agreed that by a systematic and intelligent expenditure of regular and reasonable amounts much good should result, and eventually the problem of effective water supply should be solved at a cost sufficiently low to make the work profitable and beneficial to the farming and pastoral industries particularly and the whole of the State generally.

The Irrigation Commission, in its First Annual Report, surveys the water supply and conservation works now in progress, or in contemplation, in various parts of the State both interestingly and comprehensively.

The Irrigation Act of Queensland became law in October, 1922, but some preliminary survey work on various irrigation proposals had already been undertaken, and this work became the starting point for the more active prosecution of subsequent irrigation investigations. The Act having specially authorised the initial works in connection with the Dawson Valley scheme, that undertaking was commenced last January, and work has progressed so satisfactorily that it is anticipated the first 5,000-acre section will be under irrigation in 1924. Up to the end of last June over 3,300 miles of levelling had been completed on contour surveys. Further work on this, one of the newer projects, is fully described in the report from which the following particulars are taken:—

THE DAWSON RIVER UNDERTAKING.

Though the Dawson Valley Railway is now being built, it is not sufficiently advanced for use in the transport of irrigation construction material or supplies, necessitating the establishment of a base depôt at Rannes. This entails 70 miles of haulage for all material, and, owing to the expense and slowness of wagon teams, a fleet of heavy Leyland motor transports has been purchased, and supplies are now being rapidly and economically handled in this manner. The necessary road construction has been carried out, and fuel and water bases established. The effect of the transition from horse to motor transport has been to reduce haulage from £5 per ton to about 30s. per ton, in addition to ensuring prompt and regular deliveries of material.

Another important economy effected has been in the timber supplies. A saw and planing mill of modern type has been erected on the area, and the best of hardwood is being turned out at a considerably lower cost than the purchased timber. Thus the

forest logs, which in the process of clearing would have been burnt and wasted, are utilised to the fullest extent, with consequent economy in the work of construction.

The preliminary 5,000-acre section will be served by a temporary pumping station, but the channel system has been designed so that it becomes an integral part of the larger gravitation scheme when the latter is completed.

A Model Township.

A model garden township is in progress of construction, several cottages being completed and occupied. The reticulation of the township is almost completed, and the pumping-station and power-house for generating electric current should be running by the end of 1923.

Adjacent to the township an experimental and demonstration farm of 150 acres has been cleared, fenced, and channelled, and is now being laid out for planting. The farm is situated on land which is regarded as the average texture and quality prevailing on the area. An experienced irrigation farm manager, from South Australia, is in charge of this section of the work, and it is confidently anticipated that the farm will prove of great value and assistance to settlers on the area.

The Castle Creek Section.

The general canal work on the Castle Creek 5,000-acre section is well advanced, roads and streets cleared and improved, and the survey of the individual farms is proceeding apace. This section will be in the inner zone of farms, set apart for intensive cultivation, and will comprise about 350 blocks. The Dawson scheme generally is designed on the zone system, the smaller intensive cultivation blocks in the centre, with farms of gradually increasing size as the distance from the central point of settlement increases. At each central point will be the township serving its own zone, and connected with the Dawson Valley Railway. The system is a new departure in designing irrigation settlements, and the general conformation of the area lends itself admirably to the innovation. Each zone is designed to include approximately 40,000 irrigated acres, with 40,000 acres of dry area served by a stock and domestic water supply, the latter area having a proportion of irrigated land attached to each dry holding, the dry and irrigated portions being connected with each other. Five zones, each of equal area, are included in the general design.

At Nathan Gorge.

The main Dawson storage will be held behind an arched concrete dam at Nathan Gorge (so called after the Right Hon. Sir Matthew Nathan, Governor of Queensland), the estimated storage being 2,485,000 acre feet, the largest in the world at present. The submerged area will be 83,177 acres, principally second and third class land. This immense storage has been rendered advisable by a study of the behaviour of the Dawson River over a period of years, and is considered necessary to ensure the safety of the extensive areas of land that will ultimately depend upon it. So far as surveys indicate at the present, an area of approximately 200,000 irrigated acres can be served, in addition to a further 200,000 acres of dry lands receiving a permanent stock and domestic water supply.

The Nathan Dam will rise 130 feet above summer level of the river, with a crest length of 860 feet. A hydro-electric station at the dam will utilise the stored water power, and ample current can be generated for the requirements of the area. For a length of 27 miles the Dawson River will convey the stored water to the offtake weir, forming a secondary storage within the river bed, backing up to the foot of the Nathan Dam. The offtake and regulator works will be situated at the secondary weir, and from that point the whole of the distributory system will be fed from the main gravitation canal.

A careful soil survey indicates the suitability of the Dawson Valley lands for irrigated culture. The soils range from light-red to dark sandy loam, with good capillarity, and excellent facilities for drainage. Analyses indicate a certain deficiency of lime in some portions, but as large natural deposits of lime exist on the area, this deficiency may easily be remedied.

The plates illustrating these notes are taken from the report, and are reproduced by the courtesy of the Irrigation Commission.

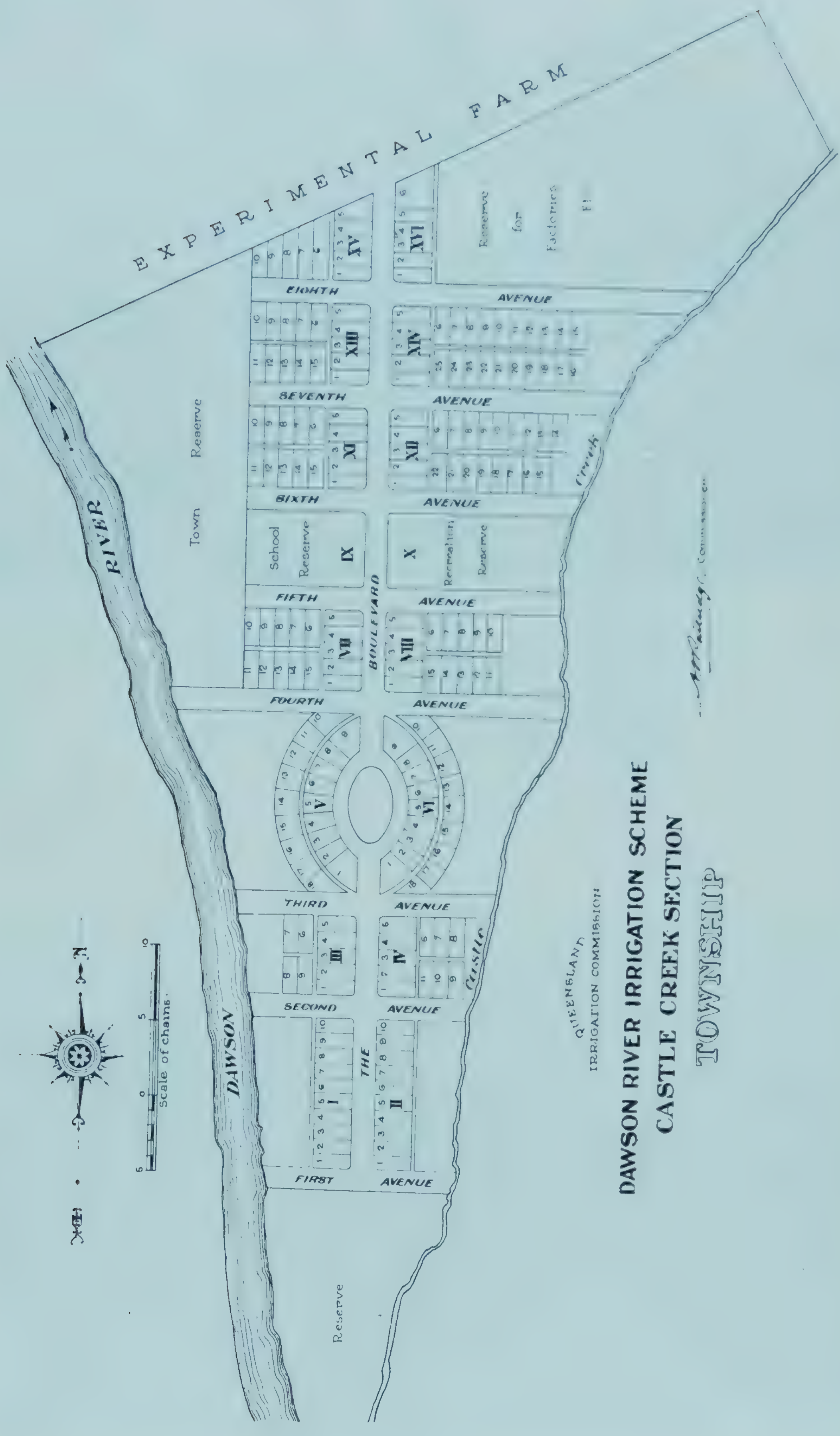
EXPERIMENTAL FARM
DAWSON RIVER
Town Reserve
School Reserve
Recreation Reserve
Reserve for Factories
Reserve
FIRST AVENUE
SECOND AVENUE
THIRD AVENUE
FOURTH AVENUE
FIFTH AVENUE
SIXTH AVENUE
SEVENTH AVENUE
EIGHTH AVENUE
THE BOULEVARD
Castle Creek
Scale of chains
QUEENSLAND IRRIGATION COMMISSION
DAWSON RIVER IRRIGATION SCHEME
CASTLE CREEK SECTION
TOWNSHIP

PLATE 111.—IRRIGATING CANE AT INKERMAN.

PLATE 112.—ON AN INKERMAN CANE FARM.

Plate 113.—Whyenbah Bore (1,497,880 Gallons per Day).

Plate 114.—An Inkerman Well—Flow, 100,000 Gallons per Hour.

PLATE 115.—BONA VISTA BORE (1,115,360 GALLONS PER DAY.)

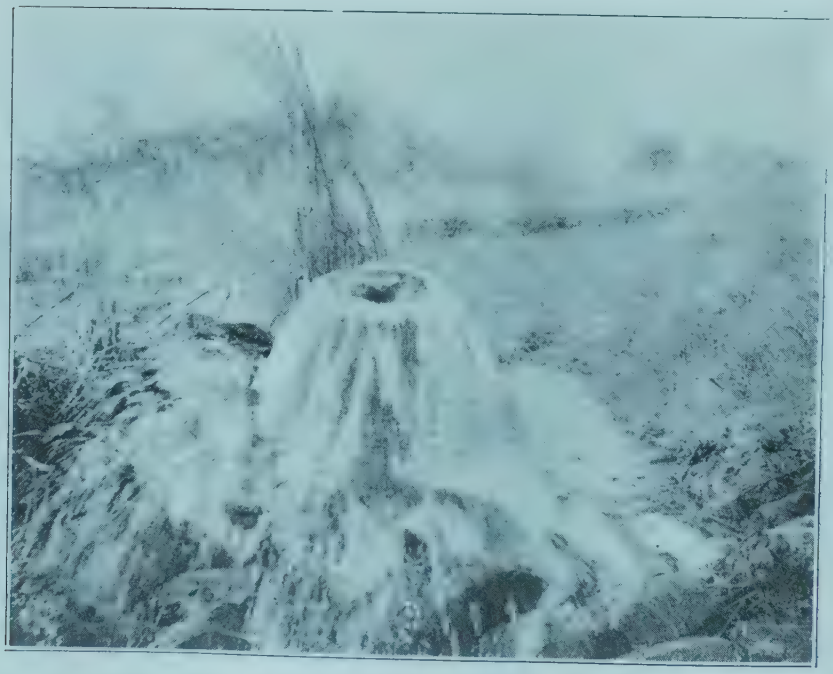

PLATE 116.—MAXWELTON No. 7 BORE (321,000 GALLONS PER DAY).

Plate 117.—Offham No. 2 Bore (1,124,000 Gallons per Day).

Plate 118.—Euloia No. 9 Bore (273,000 Gallons per Day).

General Notes.

Paper Mulching Tests.

The Department of Agriculture and Stock is about to test the efficiency of paper mulch. The department has been supplied with a quantity of the patent mulch preparation known as "Pabco," which it will test on two separate plantations. One of the tests will take place on the plantation of Mr. M. Fox, at Cleveland, where smooth-leaf pineapples will be grown in double row in a soil typical of the pineapple land of the Redlands area. The other test will be on the plantation of Mr. F. M. Ruskin, of Zillmere. There the plants will be grown in single row in soil which is of a lighter nature than that of the Redlands. The Director of Fruit Culture (Mr. A. H. Benson) states that it is claimed for the mulch that it keeps the soil warm, prevents surface evaporation, and retards weed growth, thus decreasing cultivation costs.

Man's Deadly Enemy—the Fly Pest.

"Destroy the fly's breeding place by burning manure and other organic refuse."

"Keep covers on the sugar-basin, the jam pot, the milk jug."

"Guard all food from fly contamination."

One pair of flies in five months of warm weather may breed by successive generation as many as 4,000,000,000,000,000,000 descendants.

"Watch the fly being born on the manure-heap," writes a distinguished authority on flies. "Then observe it on the edge of the milk-jug. Look at its track on the window-pane or on a sheet of clean paper. Examine its legs with a magnifying glass, and then watch it drown in a cup of hot tea. Lastly, observe the flies swarming over a ham in a restaurant or settling on the sugar-basin. Ugh! When we know what they do, it is horrid!"

The fly is indescribably dirty. Each of its six legs has two claws, and between the claws are soft, sticky pads, surrounded by hairs which secrete a sticky fluid. The mouth consists of a proboscis, which ends in two flabby pads, which can be protruded and applied to all kinds of filth, to our food, and to our faces. Legs, hairs, bristles, mouth-pads, and proboscis, sticky with what the fly feeds on, harbour disease germs which live and multiply, and which the fly in its peregrinations distributes impartially among the dwellers of mansion and cottage.

Inside the fly's crop typhoid and cholera bacteria will thrive in its food, and then, after many hours, perhaps, the germs will be regurgitated into a baby's mouth or into the invalid's beef-tea. Or the germs can multiply in the digestive processes of the fly, and be passed on to the sugar or on to the spout of the milk-jug. If people generally knew what the bacteriologist knows about the fly they would be appalled at the stream of disease and death which follows in its trail.

Talking of the fly nuisance, Professor Harrison, of Sydney University, recalled his experience in Mesopotamia in 1916, when he was sent out from England by the War Office to see what could be done to relieve the troops, who suffered horribly from a plague of flies. "The flies were so numerous," he said, "that the men could not eat their food without also swallowing the pests. Dysentry and typhoid were rife in the camp, where the old system of sanitation practised by the military obtained."

"Professor Lefroy, representing the Indian Government, was with me," added Professor Harrison. "We set to work to incinerate refuse of all kinds. During July and August it was too hot for flies to live unless in sheltered places. In those months we destroyed every likely kind of breeding-place, and then sat down to wait. A few flies came out in October, but there was nothing for them to breed in. Result, no flies. Seeing that the air was black with them in the spring, their sudden disappearance had in it something of the dramatic.

"From Kut-el-Amara," continued the professor, "we went to Bagdad, where of course, our task was complicated by the native population. Nevertheless, by strict sanitary measures we managed to keep the pest down."

"Burying night-soil," he said, "does not ensure safety. A fly can come through 6 feet of loose soil and 3 feet of hard soil. The best way of disposing of nightsoil, as well as other refuse is by burning it. Organic refuse should not be allowed to accumulate. Garden manure should be safeguarded by powdering it with borax—to stop the flies from breeding in it. Besides being a pest, the fly is a positive danger in the dissemination of disease. The incidence of fly-borne disease dropped 50 per cent. in Mesopotamia as a result of clearing out the flies."

Bottle Trees as Fodder.

A large number of settlers in the Speedwell district have been utilising bottle trees for cattle fodder during the drought period. Mr. Vin. Potter has been feeding his herd exclusively on these trees for a full month, and claims that they have kept in good condition and maintained their milk supply throughout. Mr. Potter, who is very enthusiastic over the successful results of his experiment, particularly notes that the milk yield has not been adversely affected. He estimates that each bottle tree cut down realised a clear return of £3 10s. The older farmers will remember that this form of reserve fodder was extensively utilised during the severe drought of twenty years ago.—"South Burnett Times."

Ratoon Cotton—Field Tests.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has announced that field testing is being carried out on the Melton Farm in the Callide Valley. Annual cotton is being tested against ratoon cotton properly pruned and inter-cultivated, and against ratoon cotton indifferently pruned and improperly cultivated. A fourth plot will consist of stand-over cotton planted in March and allowed to stand over until the following season. Durango is the variety, as it is felt that really accurate results can only be obtained by using a pure type of cotton. Bales of annual and first year ratoon Durango cotton grown on Mr. Bailey's farm at Capella under identical conditions have been forwarded to the Agent-General for Queensland, with the request that he will arrange spinning tests with reliable firms who are not prejudiced in any way.

In addition, samples of ratoon and annual Durango cotton grown under conditions which are known have been forwarded to the Director of the British Cotton Industry Research Association, Shirley Institute, Didsbury, who has agreed to undertake a detailed investigation into the microscopic and other characters of ratoon cotton. This Institute is one of the foremost research laboratories in the United Kingdom, and the results of its investigations should throw a great deal of light on the differences that undoubtedly exist between annual and ratoon Upland cotton. The Premier (Hon. E. G. Theodore) also proposes to make inquiries on cotton matters when in England in the coming year.

Fruit Packing Classes—Queensland System Commended.

Thus the "Australasian," 24th November, 1923:—Excellent work is being performed by the Agricultural Department of Queensland in training children in fruitgrowing districts in the best methods of packing fruit for market. . . . Since May last the Queensland Department of Agriculture has inaugurated no fewer than sixty-five classes. Already the benefits of the system are apparent in the better manner in which the fruit is packed on the market, and in the increased prices which growers have been obtaining for their fruit. It is true that the Victorian Department has conducted a few classes, but in comparison with the Queensland system many faults are evident. These are due to the department, and not to the instructor. Very little benefit accrues as a result of a packing class being held, as often is the case, for one day in the season, and it may be contended with equal fairness that when these have been continued over a period of five or six days the results are not so good as are those obtained in Queensland, where the classes are conducted throughout the season. The plan adopted there is to work with the Education Department, and to visit schools in the fruitgrowing districts. Growers are asked to supply the fruit needed, and it is to their credit they have responded well to the invitation. On the formation of a class, a lesson extending throughout the afternoon is given, and is followed by another perhaps a week later, until such time as the pupils thoroughly understand what is required of them. From this on the lessons may be given at less frequent intervals, according to the progress made, but the classes are visited periodically to see that the children are carrying out the work satisfactorily, and to correct any faults that may require attention. The advantage of this system is that with the practice the children obtain at home they rapidly become proficient, and when difficulties arise they are explained and more readily understood at the subsequent though less frequent lessons, that may be necessary as the season advances. Very little has been done in this direction in Victoria, and the value of the work has been reduced owing to the failure of the department to enable its instructor to follow it up. Another point in this connection is that the children are not only shown how to do the work, but they are obliged to do it in the presence of the instructor, who is then able to point out faults that may occur. In view of the approach of the fruit season, it is desirable that a number of classes should be organised, and that the services of the packing instructor should be used solely in this class of work. At present he is engaged in the work of orchard supervision, though owing to the citrus season there is no reason why he should not be engaged in conducting packing classes all the year round.

Sugar Exports in the Form of Manufactured Goods.

The Melbourne correspondent of the "Sugar Journal" (9th November, 1923), writes:—"I am not prepared to deny that Australia can export even ordinary sugar, but it is quite certain that she can export sugar in various forms—namely in those of jams, canned fruits, biscuits, milk, infants' and invalids' foods, confectionery, &c. The latest detailed figures are for the year ending June, 1922, and these show the value of exports as follows:—Biscuits, £173,744; confectionery, £77,094; preserved fruits, £787,246; infants' and invalids' foods, £228,640; jams and jellies, £164,045; beer, &c., £77,431; while the exported manufactured tobacco, approximating £500,000, also contains an appreciable amount of sugar, as disclosed in Parliament about 1907. The forms in which sugar can be exported are legion, but the most important at present is the sugar content of preserved and concentrated milk, the export value of which in the year I am quoting was close upon £2,000,000 sterling, and the actual weight 33,286,900 lb., 40 per cent. of which was sugar."

Some Sugar Figures.

Thus a writer in the "Australasian" (Victoria) of 24th November:—Undue prominence and many misleading statements have been made regarding the relation the cost of sugar bears to the unsatisfactory position of those engaged in the production of canning fruits. It is generally believed by those unaware of the true position that the embargo placed upon the importation of sugar has disastrously affected trade. Yet, if sugar prices, as they stand at present are examined, it will be found that Australian 1A sugar can be used in the manufacture of jams and canned fruits for the overseas trade to the United Kingdom in preference to the imported article. Java white sugar, which contains a percentage of molasses, making it unsuitable for use for jam unless the preserve is used within a period of approximately twelve months, may be obtained for £35 6s. 8d. a ton. Java brown, after being refined, will cost £40 5s. 3d. per ton. On the other hand, Australian 1A sugar costs £35 13s. a ton. On these figures the difference in the cost of a ton of sugar is in favour of Java white to the extent of 6s. 4d. a ton. If the jam or canned fruit is exported to the United Kingdom that made with the Australian sugar receives a rebate of £6 a ton, plus £4 5s. 8d., as Empire preference, which reduces its cost to £25 7s. 4d.; whereas the Java white, receiving only a drawback of £9 6s. 8d., on account of being re-exported, would cost £26 a ton, or 12s. 8d. a ton more than the better quality Australian-grown sugar. In similar circumstances the Java brown would cost £30 18s. 7d. a ton. If, however, the jam and preserves are sent to places other than the United Kingdom, Australian sugar would cost £29 13s. a ton, as compared with the Java white at £26 a ton. It is important to remember that the export rebate on sugar used in the manufacture of these commodities is based on the world's parity of the article. *It is admitted that the cost of sugar is of little consequence in connection with the canned fruits trade.*

Importation of Sugar.

The same writer continues:—Since the above figures are based on present prices, the fact cannot be disregarded that the price of sugar in other parts of the world may fall considerably in value. For more than five years the price of Java sugar has not declined below £16 5s. a ton, at which price, owing partly to its inferiority for use in jam manufacture, it is unlikely to be imported, assuming imports were permitted. This statement is supported by the fact that during the period from June to 6th December, 1921, manufacturers were at liberty to import their requirements. At that time there was a phenomenal slump in sugar, and it was obtainable from Cuba at £13 a ton, f.o.b., which is equal to £25 a ton refined and landed in the factories in Australia. Yet during this period, and despite the attractiveness of the opportunity to purchase on a low market, only 822 tons were purchased. Manufacturers certainly had a great advantage over those in other countries during the war period, and it is not improbable that a benefit will accrue to them again this year. This year there is the prospect of a world's shortage of sugar, for the Cuban estimates indicated there would be a yield of 4,105,000 tons, but on revised figures the production is set down at 3,601,000 tons, showing a diminished yield of more than 500,000 tons. One other factor which weighs in favour of the use of the Australian-grown article is that whereas it would be necessary to incur an enormous outlay in order to purchase some thousands of tons of sugar from outside sources, and bear this expenditure until eventually the jams or preserves had been manufactured, sold, and paid for, the manufacturers, who use annually about 23,000 tons in the fruit industry, are able to purchase their needs in quantities to suit their immediate requirements. Provision is made for meeting the demands of the consumer who wishes to utilise fruit for the manufacture of jam or for preserving by making it available through the Housewives' Association at 4d. a lb. at the refinery in place of the retail price of 4½d. a lb.

Australian Forest Botany.

"An Elementary Text Book of Australian Forest Botany," Vol. I., by Mr. C. T. White, F.L.S., Queensland Government Botanist, just published, has received very favourable notice in a bulletin issued by the Royal Botanic Gardens, Kew.

A Dishonest Practice.

The very high prices ruling for locally-grown potatoes have caused some growers to become regardless of the risks appertaining to what is termed "topping." At the Roma street markets recently a consignment of twenty-five bags, on being opened, was found to be mixed. The tubers on the top of the bags were of fairly good quality, whereas in the middle of the bags were potatoes only a little larger than marbles. For the information of growers who resort to this practice, it is pointed out that the departmental inspectors have power to take action with a view to prosecution.

South African Maize Shipments.

The assertion that large quantities of South African maize, grown by black labour, were being, or were about to be, imported into Queensland and the other States was referred to by the Premier (Hon. E. G. Theodore) recently.

"I think it is an unfortunate fact," Mr. Theodore said, "that maize grown by cheap labour is being dumped into Australia. I cannot say off hand what effect it will have upon our own industry.

"We have asked the Commonwealth Government for further protection, and I think the matter is being considered by the Tariff Board."

New Fruit Case Regulations.

The regulations lately in force in conformity with the provisions of the Fruit Cases Acts have been cancelled, and recently a new set received the approval of the Governor in Council. The new regulations define the meaning of "matured fruit" and of the term "packer" and stipulate that brandings on cases shall be obliterated with white water paint, instead of being removed by scraping. Under the new rules less marking is required on pineapple cases, the grade of the fruit contained in each of which will be indicated by the number of pineapples it holds. It is further provided that an inspector may seize any cases or fruit which, in his opinion, are being sold contrary to the Act or regulations.

A Jersey Test.

The secretary of the Jersey Cattle Society of Queensland advises that the cow, Lily of the Valley, the property of Mr. Thomas Thomson, Lover's Walk, Bundaberg, has completed the 273 days' test for the Advanced Register of the Herd Book. Lily of the Valley was four years and ten months old at the beginning of the test. She yielded 8,251⅛ lb. milk and 527.77 lb. butter fat, equal to 620.90 lb. butter, in the period.

The secretary draws attention to the fact that this record has been made in a season which is probably the worst which Queensland has experienced in this decade. The performance shows what sort of production would be possible in most of our good herds if adequate feed were always available, as, indeed, it should be.

Bad Show-Ring Losers.

The man who takes his defeat in a show-ring with a smile, and who congratulates the winner, sows seed of good will which is sure to produce an abundant harvest later on. He places himself in a position where everyone is glad to help him, and where no one will begrudge him any successes he may win in later years. The chronic grouser, on the contrary, builds a wall about himself through which no one cares to try to penetrate. He shuts himself off from benefits which would be his were he of a better disposition. Smile when you like. Remember you cannot lose by a smile.

Every man who shows his animals should profit by that showing, whether he bears away the victor's crown or tastes defeat. There are always reasons why he wins or why he loses. It is his duty to ascertain what those reasons are. Unless he does ascertain them he is not getting out of the show ring all that he ought to get out of it.—"Live Stock Journal."

Queensland Bananas.

A large consignment of bananas of the Cavendish variety recently attracted attention at the fruit markets. The consignment came from the North Coast, and consisted of sixty-eight bunches, containing 700 dozen. The whole line was well developed, and free from skin blemishes. There was no difficulty in finding a buyer at 9⅝d. per dozen.

A Cane Harvester.

"The Commonwealth authorities have approached the Queensland Government respecting the use of the Luce sugar-cane harvester," remarked the Premier (Hon. E. G. Theodore) recently. "This harvester," he continued, "is manufactured in the United States, and, apparently, has had satisfactory trials over there. I have pointed out to the Commonwealth authorities that it seems to us to be a matter for the sugar industry itself to try out the machine, and satisfy itself as to its prospects."

Control of Prickly-pear by Natural Enemies.

The Brisbane Chamber of Commerce has received a letter, through the Associated Chambers of Commerce, from the Prime Minister's Department, stating that the Commonwealth Government was co-operating with the State Governments of New South Wales and Queensland in a comprehensive investigation of the possibility of controlling prickly-pear by the introduction of natural enemies (insects and fungoid diseases), which attack the pear but which will not attack other plants. As soon as experiments are completed and results satisfactory, steps will be taken for the breeding of large numbers of the insects and for their liberation in various suitable localities.

Trade in Farmers' Requirements.

The trade, according to local market reports, for heavy hardware is very quiet except for building lines, in which there is again a fair movement. A good trade in paint materials and oils is reported. Following are distributors' quotations:—Barb wire, American Iowa, 12 gauge, £31; barb wire, American Iowa, 14 gauge, £32 10s.; plain black, No. 8, £21; plain black, No. 10, £22; plain galvanised, 8 gauge, £24; plain galvanised, 10 gauge, £25; wire netting, regular sizes, new list less 45 per cent. net; corrugated iron, 24 gauge, 5 to 8 feet, £31; corrugated iron, 26 gauge, 5 to 8 feet, £32 10s.; case lots only f.o.r. or f.o.b., 9 feet, 10s.; 10 feet 20s. per ton extra.

The Cotton Industry Act in Operation.

Having received the Royal Assent, the Cotton Industry Act is now in operation. One of its most important provisions is that placing an embargo on the growing of ratoon cotton.

This is dealt with in section 13 of the Act, which provides:—"(*a*) No ratoon cotton plants shall be grown. (*b*) No person shall send ratoon cotton to an authorised factory. (*c*) No person shall grow any cotton plants within the State except for commercial purposes." The section further sets out that "any person who contravenes any of the provisions of this section shall be liable to a penalty not exceeding £50."

Wheat Tests.

The whole of the wheat tests made by the Department of Agriculture on plots at the farm of Mr. H. Geitz at Allora have proved fairly successful.

Mr. C. S. Clydesdale (Assistant Instructor in Agriculture), who recently visited the Allora district for the harvesting of these plots, states that their success was mainly due to the light nature of the soil in which the wheats were grown. A fair percentage of the wheat crops in the Allora district had returned sufficient seed wheat for next season, and there was a small surplus. The new varieties introduced by the department had in the majority of cases returned seed wheat,

while one crop returned approximately six bags. The general harvesting was almost completed, and the preparation of land for maize crops was being carried out. In some instances the maize was well above the ground, but rains were required early to ensure its initial success.

The Empire Exhibition—Queensland's Effort.

"Queensland will be prominent in the Empire Exhibition especially in relation to meat, wool, forestry, minerals, cotton, sugar, and tropical and agricultural products, whilst in the secondary industries this State will send forward a representative assortment of manufactured goods. The manufacturers of Queensland have displayed commendable interest in preparing and assembling exhibits, which will give the millions of visitors at Wembly Park some idea of the advancement made by this State in secondary manufactures," said the Minister for Mines (Hon. A. J. Jones), who is also chairman of the Queensland Commission to the Empire Exhibition, recently. The Minister recently attended a meeting of the Australian Commission. In the course of a Press interview, Mr. Jones said that the preparations for Australia's participation in the Exhibition were well in hand, all of the State Commissions having worked enthusiastically for some time past to secure an adequate representation of the varied primary and secondary industries of Australia.

Mr. Jones further remarked that at least 75 per cent. of the meat exhibit would be supplied by Queensland. The quota of wool from this State was 276 fleeces and about six bales of scoured wool. The beautiful cabinet woods of Queensland would be displayed in many parts of the Australian pavilion, and the raw material of the forest as well as the finished article, in the form of artistic furniture and inlaid fancy woodwork, would be in evidence.

Continuing, Mr. Jones said that the Queensland representatives had induced the Australian Commissioners to endeavour to arrange for the propeller of the Vickers Viking aeroplane, piloted by the late Sir Ross Smith and his brother Sir Keith Smith, from London to Australia, to be exhibited at Wembly Park. This propeller was made at the Ipswich Workshops as a gift to the aviators after a forced descent at Charleville had damaged the original propeller so severely that a continuation of the flight with it was impossible.

Mr. Jones added that arrangements were practically complete for the films of Australia to be shown at the Exhibition. Pamphlets relating to the industrial and social life of Australia had been compiled and would be distributed overseas in large numbers. The Commission decided to ask the Commonwealth Government to provide a map illustrating the land, sea, river, and aerial transport facilities in Australia. Each State was being asked to nominate an assistant attendant for the live stock exhibit, which comprised thirty-two stud rams.

On the subject of the granting of official status at the Exhibition to representatives of Australian secondary industries, Mr. Jones pointed out that it was the view of the Australian Commission that the manufacturers should be adequately represented at the Exhibition without expense to the Commisison. The Commission suggested that one accredited representative should be appointed for each section, and that the several Chambers of Manufactures should be asked to classify the sections. The principle of this decision, he stated, would apply to all other industries as well as the manufacturing industry.

Mr. Jones also mentioned that the Commission approved of the suggestion that exhibitors or their representatives co-operate with the Commission's officers in the display of exhibits, the approval being subject to the maintenance of the Commission's authority in the matter. In conclusion, the Minister said that Queenslanders would be proud of the part which their State had taken to show the world what they produced and of what they were capable of producing and manufacturing. He was an ardent advocate of Australian made goods for Australian people. He hoped that one result of the Exhibtion would be the establishment of a greater number of secondary industries in Australia. What America had done, Australia also could do—probably better.

Back Numbers of the Journal.

Back numbers of the "Queensland Agricultural Journal" are available for distribution to farmers, cost free. Readers requiring them are advised to apply to the Under Secretary, Department of Agriculture and Stock, Brisbane.

To Correspondents.

Correspondents seeking information through the Journal are advised to address all inquiries to the Under Secretary, Department of Agriculture and Stock, Brisbane. Letters on official matters should not be addressed to the Editor personally.

State Wheat Board.

Mr. F. J. Morgan has been appointed chairman of the State Wheat Board for one year as from the 2nd December, 1923, and Messrs. R. Swan, A. J. Harvey, B. C. C. Kirkegaard, T. Muir, J. T. Chamberlin, and F. J. Morgan have been appointed members of the Board for one year as from the 2nd December, 1923.

Staff Changes.

Mr. J. H. Hurley, Police Constable, has been appointed Inspector of Slaughter-houses.

The resignation of Mr. J. M. Ward, Chief Instructor in Fruit Culture, has been accepted as from the 31st December, 1923. Mr. Ward has been appointed by the Victorian Government to the newly created Directorship of Horticulture in Victoria.

Stallions Registration Act.

Regulations have been issued under "*The Stallions Registration Act of* 1923" to take effect on and from the 1st January, 1924. These regulations provide that the form of application for registration of stallions shall be in a prescribed form, together with the form of statutory declaration. Regulation 3 provides for the examination of stallions, and a certificate will be refused for any stallion suffering from any hereditary defects. The registration fee is fixed at 20s., and each renewal thereof will cost 10s. Should the owner of a stallion be dissatisfied with a decision of the Board to refuse a certificate to his stallion, he shall have the right of appeal against that decision.

Standing Committees, Council of Agriculture.

In lieu of those constituted in April, 1923, the following Standing Committees of the Council of Agriculture have been formed:—

Executive: Messrs. G. H. Pritchard, T. Flood Plunkett, C. Bateman, W. Ranger, A. E. J. C. K. Graham.

Dairying: Messrs. A. McKinlay, A. E. J. C. K. Graham, J. Hardcastle, T. F. Plunkett, R. Swan, J. T. Tatnell, J. T. Todd

Fruit: Messrs. W. Biggs, T. H. Brown, W. Ranger, F. M. Ruskin, C. Bateman.

Sugar: Messrs. W. G. Batchler, W. Biggs, T. A. Powell, G. H. Pritchard, H. T. Easterby.

Transport: Messrs. W. G. Batchler, J. W. Davidson, A. Evans, A. McKinlay, W. Ranger, J. H. Sigley, R. Swan.

General Agriculture: Messrs. C. Bateman, R. K. Boyd, G. Burton, T. C. Hayes, A. Evans, H. C. Quodling, J. H. Sigley.

Dingo Board Elections.

Messrs. J. Ferrier, P. A. McNicol, R. F. Douglas, and H. E. Ferrier have been elected members of the Booringa Dingo Board. Mr. H. J. Hearn has been appointed Government representative.

Messrs. D. S. Paterson, S. Blackstock, J. F. Banks, and D. G. Evans have been re-elected members of the Barcoo Dingo Board, and the Police Magistrate, Blackall, has been appointed Government representative.

Pest Destroyers Act.

Regulations have been issued under "*The Pest Destroyers Act of* 1923" which provide for a notice to be given by a dealer, other than a wholesale dealer, and also require such dealer to forward particulars of the wholesale dealers from whom he obtains or proposes to obtain such pest destroyer. A form of notice is also provided to be given by a wholesale dealer, together with a form of particulars of the name and address of the manufacturer of the pest destroyers in which he deals. The Act provides that every such notice by a wholesale dealer shall be accompanied by a fee of five shillings, provided that the total sum payable by any dealer, by way of such fees, shall not exceed one pound in any one year. The statutory declaration required by subsection 3 of section 3 of the Act shall be in Form No. 5 of Schedule I. to the Regulations. Schedule II. provides definitions and standards for substances declared to be pest destroyers. Every wholesale dealer is required, on or before the delivery of any pest destroyer to the buyer, to affix to every package of such pest destroyer a label conforming in all respects to the label furnished to the Under Secretary, Department of Agriculture and Stock.

The label affixed to pest destroyers containing substances of a poisonous nature shall bear in red letters, in larger type than any other letter on the label and on the first line of such label, the word "Poison." All pest destroyers of a poisonous nature, in addition to having the prescribed label affixed, shall be contained in receptacles which will be readily distinguished from any other bottle or jar. In the case of casks, &c., containing poison in bulk, in addition to the label, the immediate container shall be firebranded with the word "Poison" on the side and top in letters not less than three-quarters of an inch in height, and in the case of tins or other metal containers, the word "Poison" shall be embossed or impressed on the side and top of each container in letters not less than five-sixteenths of an inch in height. Every dealer who sells any pest destroyer of greater value than 5s. shall, on or before delivery of such pest destroyer, sign and give to the buyer an invoice setting out the name and address of the dealer, the net weight or imperial measure, and the name of the pest destroyer, and a warranty to the effect that the constituents and percentages of the pest destroyer sold accurately correspond with the constituents and percentages stated in the statutory declaration furnished to the Under Secretary, Department of Agriculture and Stock, Brisbane. Regulation 8 provides for a scale of fees payable by any dealer or manufacturer for the analysis of any pest destroyer. Regulation 9 provides for a fee of 10s. 6d. payable by any buyer other than a dealer for the analysis of any pest destroyer, and provides also for the method of obtaining such analysis. The label and directions for use shall not contain any statement which is false or misleading in any particular concerning the substances referred to. Any person who causes or permits any label to be false in any particular shall be guilty of a breach of the Regulations, and will be liable to a penalty not exceeding £20.

Agricultural Societies—Subsidies and Duties.

When, upon the motion of Mr. Pugh, M.L.A., in 1867, Parliament granted subsidies to agricultural societies, it was clearly the intention, and that intention still holds good, that the subsidy is intended for the advancement and encouragement of agriculture and stock-raising; also that it should be used for that object in other ways than by holding a yearly show. To-day, however, an agricultural society considers its existence fully justified if it holds a show once a year and then goes into recess until the time arrives for the preparation for the succeeding event. And even at the annual show the operations are not equally divided between agriculture and stock; the latter have far the greater share of the prize money, and the result is that the agricultural exhibits are falling off in quality and quantity—a state of affairs that is not to be wondered at with the poor encouragement offered. It is to be admitted that horses, cattle, sheep, swine, poultry, and other live stock, are components of farming, but in the economy of agriculture the first place must of necessity be allotted to production, but at agricultural shows it has to be content with second place. Ring events draw the public, but here again the intention of Parliament is being defeated, because, owing to the better prize money, the horse competitions, instead of encouraging the local improvement of horses, have called into being a professional show class which travels from show to show, and so the local man is discouraged. Seldom are there to be seen in a show programme any prizes offered of purely local character, but instead they are for open competition, of which the professional owners are not slow to take advantage. The first care of an agricultural society should be the primary products and the direct manufactures from them, for upon them the whole well-being of the rural community is built.

Answers to Correspondents.

Remedy for a Self-sucking Cow.

"DAIRYMAN" (Kumbia)—The Director of Dairying (Mr. E. Graham) advises:—

It must be first ascertained whether the cow sucks her teats while lying down or in a standing position. (Cows may suck in either position.)

In the latter case, a moderately efficacious means of overcoming the trouble is to affix upon the cow a head-stall, with a nose-piece comprised of stout leather, and through the nose-band ordinary 3-inch wire nails are driven, the pointed ends being exposed, and to keep the nails from retracting a strip of tin fastened to the leather band over the heads of the nails, the points of which may be sharpened, if necessary, with a file, or upon a grindstone. The points of the nails prick the hide of the cow whenever she attempts sucking.

When a cow sucks her teats while lying down, the foregoing remedy may not always prove satisfactory, as frequently, when the animal is lying at rest, the teats may be sucked by the cow without bringing the points of the nails into contact with her flanks. To meet such cases, take a triangular-shaped piece of light wood, cut off the apex several inches down the triangle, and hollow the remaining piece of wood directly below the cut, leaving the edges of the wood available to fit into the nostril cavities, and thereby gain support for the piece of wood which falls over the mouth of the animal and debars her from sucking, but leaves her at liberty to graze and take water.

If heavy wood is used, or the points of wood which act as a hinge are left in a rough condition, the nose of the animal may become chafed as a consequence.

Many experienced dairymen remove from the herd any animal that develops the habit of "sucking," but possibly there are exceptional cases where the application of remedial measures is warranted.

The Director of Agriculture (Mr. H. C. Quodling) replies to a correspondent as follows:—

Rhodes Grass.

Rhodes grass grown on rather poor soil near Brisbane was compared with locally-procured good-looking samples of chaff. Analyses showed that practically double the value of protein contents were present in Rhodes grass as compared with the oaten and wheaten chaff. An analysis of samples of Soudan grass grown at Gatton College and Hermitage State Farm also showed protein content considerably higher than that of oaten or wheaten chaff. (A table of analyses will be published in the January Journal.)

Ringing or Falling Brigalow or Ti-tree Scrubs—Which is the Better Method?

This depends largely on what noxious weeds are present or prevailing in the district. Ringbarking brigalow in localities which are pear infested is not recommended, but in the absence of prickly-pear it is a cheap and effective method. The area may ultimately be burnt off by a system of "Yankee" grubbing. Where there is a risk of encouraging the growth of noxious weeds by this method it would probably be better to fall and subsequently burn before any weed growth becomes evident. The period which timber should be left before firing depends on the time of the year at which it was felled, but fallen scrub should obviously be dry enough to ensure a good burn. Lopping after falling would help towards ensuring a clean burn.

"Cotton Bush."

There are several plants known by the name of "Cotton Bush," some of which are very free seeding in their habits. Without a specimen it would be difficult to say definitely whether the plants would be self-exhausting or not. It would be far wiser to take no chance and to use every means of eradication.

Farm and Garden Notes for January.

Field.—The main business of the field during this month will be ploughing and preparing the land for the potato and other future crops, and keeping all growing crops clean. Great care must be exercised in the selection of seed potatoes to ensure their not being affected by the Irish blight. Never allow weeds to seed. This may be unavoidable in the event of long-continued heavy rains, but every effort should be made to prevent the weeds coming to maturity. A little maize may still be sown for a late crop. Sow sorghum, imphee, Cape barley, vetches, panicum, teosinte, rye, and cowpeas. In some very early localities potatoes may be sown, but there is considerable risk in sowing during this month, and it may be looked upon merely as an experiment. Plant potatoes whole. Early-sown cotton will be in bloom.

As the wet season is expected to commence this month, provision should be made accordingly.

On coastal and intercoastal scrub districts, where recently burnt-off scrub lands are ready for the reception of seed of summer-growing grasses, sowing may commence as soon as suitable weather is experienced. Much disappointment may be saved, and subsequent expenditure obviated, by ensuring that only good germinable grass seed is sown, of kinds and in quantities to suit local conditions, the circumstance being kept in mind that a good stand of grass is the principal factor in keeping down weeds and undergrowth.

In all districts where wheat, barley, oats, canary seed, and similar crops have recently been harvested, the practice of breaking up the surface soil on the cropped areas should invariably be adopted. Soil put into fit condition in this way will "trap" moisture and admit of the rains percolating into the subsoil, where the moisture necessary for the production of a succeeding crop can be held, provided attention is given to the maintenance of a surface mulch, and to the removal, by regular cultivation, of volunteer growths of all kinds. If not already seen to, all harvesting machinery should be put under cover, overhauled, and the woodwork painted where required.

Where maize and all summer-growing "hoed" crops are not too far advanced for the purpose, they should be kept in a well-cultivated condition with the horse hoe. Young maize and sorghum crops will derive much benefit by harrowing them, in the same direction as the rows are running, using light lever harrows with the tynes set back at an angle to obviate dragging out of plants, but the work should not be done in the heat of the day.

Quick-maturing varieties of maize and sorghum may still be sown in the early part of the month in coastal areas where early frosts are not expected.

Succession sowings may be made of a number of quick-growing summer fodder crops—Sudan grass, Japanese and French millet, white panicum, and liberty millet (panicum). In favourable situations, both "grain" and "saccharine" sorghums may still be sown; also maize, for fodder purposes.

Fodder conservation should be the aim of everyone who derives a living from stock, particularly the dairyman; the present is an important period to plan cropping arrangements. Exclusive of the main crops for feeding-off (when fodder is suitable for this purpose), ample provision should be made for ensilage crops to be conserved in silo or stack. As natural and summer-growing artificial grasses may be expected to lose some of their succulence in autumn, and more of it in winter and early spring, the cropping "lay-out" to provide a continuity of succulent green fodder throughout the season calls for thorough and deep cultivation and the building up of the fertility and moisture-holding capacity of the soil. Planter's friend (sorghum) may be sown as a broadcast crop at the latter end of the month for cutting and feeding to cattle in the autumn and early winter. Strips of land should be prepared also for a succession sowing about the second week in February, and for winter-growing fodder crops.

Kitchen Garden.—A first sowing of cabbages, cauliflower, and Brussels sprouts may now be made in a covered seed bed, which must be well watered and carefully protected from insect pests. Sow in narrow shallow drills; they will thus grow more sturdy, and will be easier to transplant than if they were sown broadcast. The main points to be attended to in this early sowing are shading and watering.

Give the beds a good soaking every evening. Mulching and a slight dressing of salt will be found of great benefit. Mulch may consist of stable litter, straw, grass, or dead leaves. Dig over all unoccupied land, and turn under all green refuse, as this forms a valuable manure. Turn over the heavy land, breaking the lumps roughly to improve the texture of the soil by exposure to the sun, wind, and rain. In favourable weather, sow French beans, cress, cauliflower, mustard, cabbage, celery, radish for autumn and winter use. Sow celery in shallow well-drained boxes or in small beds, which must be shaded till the plants are well up. Parsley may be sown in the same manner. Turnips, carrots, peas, and endive may also be sown, as well as a few cucumber and melon seeds for a late crop. The latter are, however, unlikely to succeed except in very favourable situations. Transplant any cabbages or cauliflowers which may be ready. We do not, however, advise such early planting of these vegetables, because the fly is most troublesome in February. For preference, we should defer sowing until March. Still, as "the early bird catches the worm," it is advisable to try and be first in the field with all vegetables, as prices then rule high. Cucumbers, melons, and marrows will be in full bearing, and all fruit as it ripens should be gathered, whether wanted or not, as the productiveness of the vines is decreased by the ripe fruit being left on them. Gather herbs for drying; also garlic, onions, and eschalots as the tops die down.

FLOWER GARDEN.—To make the flower-beds gay and attractive during the autumn and winter months is not a matter of great difficulty. Prepare a few shallow boxes. Make a compost, a great part of which should consist of rotten leaves. Fill the boxes with the compost; then sow thinly the seeds of annuals. Keep the surface of the soil moist, and when the young seedlings are large enough to handle, lift them gently one by one with a knife or a zinc label—*never pull them up by hand,* as, by so doing, the tender rootlets are broken, and little soil will adhere to the roots. Then prick them out into beds or boxes of very light soil containing plenty of leaf mould. Keep a sharp lookout for slugs and caterpillars.

All kinds of shrubby plants may be propagated by cuttings. Thus, pelargoniums, crotons, coleus, and many kinds of tropical foliage plants can be obtained from cuttings made this month. After putting out cuttings in a propagating frame, shade them with a piece of calico stretched over it. Be careful not to over-water at this season. Propagate verbenas, not forgetting to include the large scarlet Foxhunter. Verbenas require rich soil. Palms may be planted out this month. If the weather prove dry, shade all trees planted out. With seed-boxes, mulch, shade, water, and kerosene spray, all of which imply a certain amount of morning and evening work, the flower garden in autumn and winter will present a charming sight.

Orchard Notes for January.

THE COASTAL DISTRICTS.

All orchards, plantations, and vineyards should be kept well cultivated and free from weed growth; in the first place, to conserve the moisture in the soil, so necessary for the proper development of all fruit trees and vines; and, secondly, to have any weed growth well in hand before the wet season commences. This advice is especially applicable to citrus orchards, which frequently suffer from lack of moisture at this period of the year if the weather is at all dry, and the young crop of fruit on the trees is injured to a greater or less extent in consequence.

Pineapple plantations must also be kept well worked and free from weeds, as when the harvesting of the main summer crop takes place later on, there is little time to devote to cultivation. If this important work has been neglected, not only does the actual crop of fruit on the plants suffer, but the plants themselves receive a setback.

Banana plantations should be kept well worked, and where the soil is likely to wash badly, or there is a deficiency of humus, a green crop for manuring may be planted. Should the normal wet season set in, it will then soon cover the ground without injury to the banana plants. When necessary, banana plantations should be manured now, using a complete manure rich in potash and nitrogen. Pineapples may

also be manured, using a composition rich in potash and nitrogen, but containing no acid phosphate (superphosphate) and only a small percentage of bone meal, ground phosphatic rock, or other material containing phosphoric acid in a slowly available form.

Bananas and pineapples may still be planted, though it is somewhat late for the former in the more southern parts of the State. Keep a good lookout for pests of all kinds, such as Maori on citrus trees, scale insects of all kinds, all leaf-eating insects, borers, and fungus pests generally, using the remedies recommended in Departmental publications.

Fruit fly should receive special attention, and on no account should infested fruit of any kind be allowed to lie about on the ground to become the means of breeding this serious pest. If this is neglected, when the main mango crop in the South and the early ripening citrus fruits are ready, there will be an army of flies waiting to destroy them.

Be very careful in the handling and marketing of all kinds of fruit, as it soon spoils in hot weather, even when given the most careful treatment. Further, as during January there is generally more or less of a glut of fresh fruit, only the best will meet with a ready sale at a satisfactory price.

Grapes are in full season, both in the Brisbane and Coominya districts, and in order that they may be sold to advantage they must be very carefully handled, graded, and packed, as their value depends very much on the condition in which they reach the market and open up for sale. Well-coloured fruit, with the bloom on and without a blemish, always sells well, whereas badly coloured, immature, or bruised fruit is hard to quit.

One of the greatest mistakes in marketing grapes is to send the fruit to market before it is properly ripe, and there is no better way to spoil its sale than to try and force it on the general public when it is sour and unfit to eat.

Bananas for sending to the Southern States require to be cut on the green side, but not when they are so immature as to be only partially filled. The fruit must be well filled but show no sign of ripening; it must be carefully graded and packed and the cases marked in accordance with the regulations under the Fruit Cases Acts and forwarded to its destination with as little delay as possible.

Pineapples should be packed when they are fully developed, which means that they contain sufficient sugar to enable the fruit to mature properly. Immature fruit must not be marketed, and if an attempt is made to do so the fruit is liable to seizure and the sender of the fruit to prosecution under the abovenamed regulations. Further, the fruit must be graded to size and the number of fruit contained in a case must be marked thereon. Immature fruit must not be sent. For canning, the fruit should be partly coloured; immature fruit is useless; and overripe fruit is just as bad. The former is deficient in colour and flavour and the latter is "winey" and of poor texture, so that it will not stand the necessary preparation and cooking.

Should there be a glut of bananas, growers are advised to try and convert any thoroughly ripe fruit into banana figs.

The fruit must be thoroughly ripe, so that it will peel easily, and it should be laid in a single layer on wooden trays and placed in the sun to dry. If the weather is settled, there is little trouble, but if there is any sign of rain the trays must be stacked till the weather is again fine, and the top of the stack protected from the rain. To facilitate drying, the fruit may be cut in half lengthways. It should be dried till a small portion rubbed between the finger and thumb shows no sign of moisture. It can be placed in a suitable box to sweat for a few days, after which it can be dipped in boiling water to destroy any moth or insect eggs that may have been laid on it during the process of drying and sweating. It is then placed in the sun to dry off any moisture, and when quite dry it should be at once packed into tight boxes lined with clean white paper. It must be firmly packed, when, if it has been properly dried, it will keep a considerable time. It can be used in many ways, and forms an excellent substitute for raisins, sultanas, currants, or other dried fruits used in making fruit cakes and other comestibles. Banana figs will be found useful for home consumption, and it is possible that a trade may be built up that will absorb a quantity of fruit that would otherwise go to waste.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

January is a busy month in the Granite Belt, and orchardists are fully occupied gathering, packing, and marketing the crop of midseason fruits, consisting of plums of several kinds, peaches, nectarines, pears, and apples. The majority of these fruits are better keepers and carriers than those that ripen earlier in the season; at the same time, the period of usefulness of any particular fruit is very limited, and it must be marketed and disposed of with as little delay as possible.

The advice given in the Notes for December, to send nothing but first-class fruit to market, still holds good. With the great increase in production, owing to the large area of new orchards coming into bearing and the increasing yields of those orchards that have not come into full profit, there is not likely to be any market for immature or inferior fruit. There will be ample good fruit to fully supply the markets that are available and accessible. Much of the fruit will not carry much beyond the metropolitan market, but firm-fleshed plums, clingstone peaches, and good, firm apples should stand the journey to the Central, and, if they are very carefully selected, handled in a manner to prevent any bruising, and properly graded and packed, they should carry as far as Townsville. Growers must remember that, given a market fully supplied with fruit, only such fruit as reaches that market in first-class condition is likely to bring a price that will pay them; consequently the grower who takes the trouble to send nothing but perfect fruit, to grade it for size and colour, to pack it carefully and honestly, placing only one sized fruit, of even quantity and even colour, in a case, and packing it so that it will carry without bruising, and, when opened up for sale, will show off to the best advantage, is pretty certain of making good. On the other hand, the careless grower who sends inferior, badly graded, or badly packed fruit is very likely to find, when the returns for the sale of his fruit are to hand, that after paying expenses there is little, if anything, left. The expense of marketing the fruit is practically the same in both cases.

Then "why spoil the ship for the ha'p'orth of tar" after you have gone to the expense of pruning, spraying, manuring, and cultivating your orchard? Why not try and get a maximum return for your labour by marketing your fruit properly? The packing of all kinds of fruit is a fairly simple matter, provided you will remember—

(1) That the fruit must be fully developed, but yet quite firm when gathered.

(2) That it must be handled like eggs, as a bruised fruit is a spoilt fruit, and, when packed with sound fruit, spoils them also.

(3) That only one-sized fruit, of an even degree of ripeness and colour, must be packed in a case.

(4) That the fruit must be so packed that it will not shift, for if it is loosely packed it will be so bruised when it reaches its destination that it will be of little value. At the same time, it must not be packed so tightly as to crush the fruit.

If these simple rules are borne in mind, growers will find that much of the blame they frequently attribute to the fruit merchants or middlemen is actually the result of their own lack of care. Fruit that opens up in the pink of condition sells itself, whereas any fruit that opens up indifferently is hard to sell on any except a bare market, and on a glutted market is either unsaleable or realises such a poor price that the grower is frequently out of pocket and would have been better off had he not attempted to market it.

If spraying with arsenate of lead, and systematic bandaging, has been properly carried out, there will be comparatively few codlin moths to destroy the later ripening pip fruits; but if these essential operations have been neglected or carelessly carried out, a number of moths will hatch out and the eggs laid by them will turn to larvæ that will do much damage, in some cases even more than that caused by the first broods that attack the fruit as soon as it is formed. Where there is any likelihood, therefore, of a late crop of moths, spraying with arsenate of lead must be continued if the late crop of pip fruits is to be kept free from this serious pest.

Fruit fly must be systematically fought, and on no account must any fly-infected fruit be allowed to lie about on the ground and breed this pest, to do further damage to the later ripening fruits.

Citrus orchards will need to be kept well cultivated in the drier and warmer parts of the State, and, where necessary, the trees should be irrigated. If scale insects are present, the trees should be either sprayed, or, better still, treated with hydrocyanic acid gas.

Western grapes are in full season, and if they are to be sent long distances by rail, then they are all the better to be cut some hours before they are packed, as this tends to wilt the stems and keep the berries from falling off in transit. The fruit must be perfectly dry when packed, and should be as cool as possible. It must be firmly packed, as a slack-packed case always carries badly and the fruit opens up in a more or less bruised condition.